

EVERYMAN'S
ENCYCLOPAEDIA
IN TWELVE VOLUMES

VOLUME SIX
FILIBUSTERS—HAGGIS

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FILIBUSTERS—HAGGIS

LIST OF ABBREVIATIONS

ac., acres.	i.e., that is.
A.D., after Christ.	in., inches.
agric., agricultural.	inhab., inhabitants.
ambas., ambassador.	Is., island, -s.
ann., annual.	It., Italian.
arron., arrondissement.	Jour., journal.
A.-S., Anglo-Saxon.	Lat., Latin.
A.V., Authorised Version.	lat., latitude.
b., born.	l. b., left bank.
B.C., before Christ.	long., longitude.
Biog. Dic., Biographical Dictionary.	m., miles.
bor., borough.	manuf., manufacture.
bp., birthplace.	mrkt. tn., market town.
C., Centigrade.	Mt., mts., mount, mountain, -s.
c. (<i>circa</i>), about.	N., north; northern.
cap., capital.	N.T., New Testament.
cf., compare.	O.T., Old Testament.
co., county.	par., parish.
com., commune.	parl., parliamentary.
cub. ft., cubic feet.	pop., population.
d., died.	prin., principal.
Dan., Danish.	prov., province.
dept., department.	pub., published.
dist., district.	q.v., which see.
div., division.	R., riv., river.
E., east; eastern.	r. b., right bank.
eccles., ecclesiastical.	Rom., Roman.
ed., edition; edited.	R.V., Revised Version.
e.g., for example.	S., south; southern.
Ency. Brit., Encyclopædia Britannica.	sev., several.
Eng., English.	Sp., Spanish.
estab., established.	sp. gr., specific gravity.
et seq., and the following.	sq. m., square miles.
F., Fahrenheit.	temp., temperature.
fl., flourished.	ter., territory.
fort. tn., fortified town.	tn., town.
Fr., French.	trans., translated.
ft., feet.	trib., tributary.
Ger., German.	U.S.A., United States of America.
Gk., Greek.	vil., village.
gov., government.	vol., volume.
Heb., Hebrew.	W., west; western.
Hist., History.	yds., yards.

ENCYCLOPAEDIA

F

Filibusters (probably a Spanish form of our word 'freebooter,' derived from Dutch *vrijbuitter*) are pirates and in general adventurers who practise illegal warfare for their ends. Thus the American adventurers who took part in the revolutions of Spanish S. America, with the purpose of increasing the anarchy to their own profit, were popularly called Fs., and in the United States the expression is frequently used of politicians whose one game is obstruction. In England the word F. is also applied to a small fast-sailing ship. *See also* BUCCANEERS.

Filicaia, Vincenzo da (1642-1707), an Italian lyrical poet, who came of a noble Florentine family. He became famous on account of a series of odes written in commemoration of the victories of Sobieski. He is also noteworthy for the few very beautiful sonnets he wrote, the most famous of which was *Italia, Italia, O tu cui feo la sorte*. There is a translation by Borrow in his *Wild Wales*. In 1864 a new edition of his *Poesie e Lettere* was published.

Filigree (from Lat. *filum*, a thread; and *granum*, a grain), delicate jewel and ornamental work made of twisted gold or silver wire. The metal threads are finely interlaced, solder being used to strengthen the points of union, and are wrought into intricate volutes and spirals. In the 'Tara' brooch and other Irish work of the tenth and eleventh centuries, however, the design is skilfully contrived by a single long thread. To-day the best F. work comes from the United and Central Provinces of India, where the art has been practised from time immemorial, from Malta and from Scandinavia, where the daintiest silver buttons and brooches are fashioned, with a further decoration of tiny chains and pendants. F. patterns were often built on to a solid

metal ground; in the Middle Ages the Moors of Spain used in this way to embellish croziers and reliquaries. Up to the twelfth century Byzantine goldsmiths lavished a great deal of artistic skill on F. work, and a few illustrations of their handiwork show that the art was well-known both to the Etruscans and the Celts.

Filipepi, Alessandro di Mariano dei, *see* BORTICELLI, SANDRO.

Filipescu, Nicola (1857-1916), Rumanian statesman. Studied law in Paris, and on return to Rumania was elected deputy. Minister of Agriculture 1900; of War, Jan. 1911 till April 1912—re-organised army, and then Minister of Agriculture again till March 1913. A member of the Conservative party, he belonged, during the Great War, to the pro-Entente section led by Jean Labovary, after whose death in 1915 he succeeded to the leadership and effected a junction with the Conservative-democrats; and he organised an interventionist campaign just before his death on Oct. 13.

Fillan, Saint, the name of two distinct holy men of Scotland, whose festivals are held on June 20 and Jan. 9 respectively. The 'June' St. Fillan is the older of the two. He was called 'an lobar,' the leper, and a church was dedicated to him at Loch Earn in Perthshire. The other was of Irish origin, being the son of Forcadach of Munster and St. Kentigern. He d. at Strathfillan in 777, and here as early as 800 an Augustinian priory was built in his honour. Within its grounds was the 'pool of Fillan,' whose waters accomplished miracles of healing. Two relics of this saint, the Quigrich and a bell, are preserved in the Antiquarian Museum of Edinburgh.

Fillet (from Lat. *filum*, a thread), an architectural term, applied to the narrow ribbon-like bands, so common

both in Greek and Gothic architecture, to separate mouldings one from the other. Fs., also called 'listels,' are used between the flutings of Ionic and Corinthian pillars.

Fillmore, Millard (1800-74), thirteenth president of the U.S.A., rose, like many others who have held that office, by the sheer force of his own high abilities and sterling moral character, and might with justice have said that he was handicapped rather than assisted by the accident of birth. In 1820 he broke away from his apprenticeship to a dyer, and having studied hard in Buffalo was called to the Bar in 1823. In his law practice he prospered, especially when in 1832 he entered into partnership with Nathan Hall and later with Solomon Haven. Having served in the state legislature of New York (1828-32) he next sat in Congress for eight years between 1833 and 1843. From 1850-53 he held the chief magistracy, succeeding President Zachary Taylor upon the latter's death, the office coming to him as the elected Vice-President. In policy he allied himself with the Whigs, supported measures framed to mitigate the evils of slavery, advocated protective tariffs, and in 1851 tried to prevent the invasion of Cuba, which the 'filibusters' urged. His active support of the Fugitive Slave Law endangered his popularity.

Filmer, Sir Robert (c. 1589-1653), an Eng. writer on politics, matriculated at Trinity College, Cambridge, was knighted by Charles I., and being an ardent Royalist, had his house again and again pillaged by the Roundheads during the Civil War. In his *Patriarcha* (1680) and other pamphlets he develops to a ludicrous extent the theory of the divine right of kings. Yet the fact that Locke took the trouble to expose his fallacies *seriatim* in the *Treatise on Government* shows that at the time at least his theories made a grave impression.

Films, see CINEMATOGRAPH.

Filmy Ferns are found native in the moist woods of the tropics, but many species are cultivated in Britain. In many forms the fronds are filamentous, and some have the appearance of Liverworts. They require a great deal of moisture, which is best obtained by growing them in closed cases; a cool greenhouse is sufficient, but they must be kept well guarded from the sun. They should be planted in sphagnum, peat, or fibre; ordinary soil is unsuitable. *Hymenophyllum* and *Trichomanes* are the two genera, including the majority of F. F., of which there are about seventy species; but *Toodea superba*, belong-

ing to the Osmundaceæ, is often cultivated.

Filters. Solid matter which is suspended, but not dissolved in a liquid, may be separated again by a variety of methods. The commonest is the use of F., by means of which the liquid is made to flow through one or more porous substances, which will not allow the suspended matter to pass. The simplest form of F. is that used in chemical laboratories, where a circular piece of blotting paper is folded into a quadrant and opened into a hollow conical shape. Placed in a glass-funnel this fits closely to the sides, and as the liquid is poured through, the precipitate collects on the paper, and can easily be removed. When liquids are dealt with which attack paper, glass, wool or asbestos fibres may be used instead of paper. One simple method of accelerating filtration is to use a funnel with a long stem. Another more effective method is to employ a Buchner funnel, i.e. a porcelain funnel with a perforated base on which a filter paper is placed. The funnel fits into a bottle with a side tube connected to a F. pump. Difficulties sometimes arise when crystallisation from hot liquids takes place in the funnel stem. To avoid this, double-walled funnels are used, the space between the two surfaces being filled with hot water. Some suspensions are of such a fine nature that the solid particles are not efficiently retained by ordinary F. paper, in which case the remedy is to use special paper with smaller pores. Even this will not suffice to F. colloidal solutions. For the ordinary purpose of filtering water for domestic purposes, a large number of F. have been devised. They mainly differ in the manner of drawing the dirty water through them. It is usual to use, as the filtering substances, sand and charcoal in some form. A home-made F. is often constructed of two flower-pots placed one inside the other. In the lower one is placed a sponge to plug the hole, then a layer of pebbles, upon which is a layer of sand with powdered charcoal resting upon it, and this in its turn held down by another layer of pebbles. In the upper pot is only a sponge to prevent the water flowing too fast into the F. By this means quite a pure water may be obtained. The F. which are manufactured for use on shipboard, and by soldiers, etc., work on this principle, but are constructed so that the sediment may be removed. So that this may be done, devices are used so that the water may be filtered as it ascends. Thus, if a F. has four compartments, and the water is stored in the top one, and passed by

a pipe to the bottom one, then it will ascend through the middle chambers. This is the principle adopted in Leloge's F. When the stored water reaches the lowest chamber, it ascends through a porous filtering stone, to the filtering chamber, from whence it still ascends through a second stone to the chamber from whence it is drawn off. The sediment can be removed from the lowest chamber by withdrawing a plug. Another form of F. consists of a cylindrical pot containing the filtering media, and with a long tube attached to it. This pot is lowered into the water, and by using the tube as a syphon (*q.v.*), the water is drawn up through the pot and filtered on its way. This method has been utilised for travellers and others who may have to drink from turbid sources. A porous cylindrical stone, consisting of compressed carbon, is fitted on to one end of a flexible tube, to the other end of which is attached a mouthpiece. Then the traveller, lowering the filtering end into the pond, may drink clean water direct from the turbid source. Not only does filtration remove solid matter, but it is well known that charcoal acts upon any soluble organic matter which may be present, so purifying the water. This is of great importance, as very clear water may be highly dangerous to drink on account of the presence of organic matter. The length of time that the charcoal is efficient is, therefore, of the greatest importance. For this same reason charcoal is often placed at the openings from which issue deleterious gases, and so the air is filtered, rendering it inodorous and often innocuous. For filtering on the large scale F. presses are used. The simplest forms consist of a series of chambers connected with each other by a central hole. F. cloths inside the chambers retain the precipitate, and the filtrates are let out through taps at the bottom (*cf. Filtration and Filters*, Pickard). See SEWAGE, WATER; and for other processes of clarification (*q.v.*) see WINE, SUGAR, BEER, OIL, SYRUP, etc.

Fimbria, Gaius Flavius (*d.* 84 B.C.), a Roman soldier, was an enthusiastic supporter of the demagogue Marius, and was at pains to colour his partisanship by perpetrating needless barbarities against his enemies. Having slain Flaccus, his superior in Asia, at Nicomedia, he worsted Mithridates with Flaccus' army. Finally, he committed suicide rather than fall into the hands of Sulla, whose adherents in Asia he had persistently ill-treated.

Fin, see FINS.

Finale (an Italian word meaning 'end'), a musical term, describing

the conclusion of a composition. In instrumental music, that is, in symphonies, concertos, sonatas, quartettes, etc., it is the last movement, which is variously handled by different musicians, as the recollection of Haydn's sprightly rondos and Beethoven's grand choral F. to his ninth symphony will immediately show. Mozart and other composers bring the several acts of their operas to a close by a concerted piece or F. Wagner, however, broke away from this practice.

Finance Acts, in British administration, are formal Acts of Parliament which, after the Budget (*q.v.*) has been introduced by the Chancellor of the Exchequer, are necessary in order to give effect to its provisions. The first and more important of these is the Finance Act, which embodies the chief alterations in methods of raising revenue. This is occasionally a very long and involved document, as the utmost precision is necessary when such methods as those relating to Income Tax are revised; but where the changes are few and no fundamental system is affected the Finance Act may be one of the simplest and briefest for the year. The Appropriation Act, which follows, is a formal measure for voting the necessary funds to the various spending departments, and is usually supplemented at the end of the financial year by a similar measure which legalises any additional expenditure that may have become necessary. These Acts, as they deal chiefly with finance, do not require the approval of the House of Lords. When they have been passed by the Commons they are sent to the upper chamber with the Speaker's certificate attached declaring them to be Money Bills.

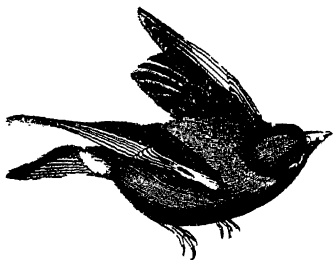
Finance, National, see BUDGET, TREASURY, PUBLIC DEBT.

Financial News, The, a London morning daily paper, founded in 1884. Prior to its appearance the *Financier* (established in 1870) was the only regular daily which attempted to give detailed news of markets, stocks and shares, prices, and of anything, in fact, which was likely to be of especial interest to business men. The head offices are at 20, Bishopsgate, E.C.2, and the price is twopence.

Financial Times, The, a London morning daily paper, which first appeared in 1888. Offices, 72, Coleman Street, E.C.2.

Finch, a name given to members of the Fringillidae, a family of hard-billed singing birds which inhabit the northern hemisphere. They are almost unknown in Australia. The

Fringillidæ are divided into several sub-families, according to the formation of the skull and beak. The *Coccothraustine*, or grosbeaks, inhabit the Old and New Worlds, and extend as far S. as India. Their bills are fairly stout and acute, and they have bright-coloured plumage, green and yellow predominating. The species *Ligurinus chloris*, or common green-finch, is often heard in gardens and small plantations. It feeds on the seed of the wild mustard and other weeds, and has plumage of olive yellow, shading to grey. Other members of this group are the *Coccothraustes vulgaris*, or European hawfinch, and the *Hedymeles virginianus*, or rose-breasted grosbeak, a handsome and sweet-voiced bird. The sub-family *Fringillinæ* are distinguished by their softer bills and by their cranial differences. The *Fringillæ*



GREEN-FINCH

cœlebs, or common chaffinch, is a general favourite in the British Isles, and may be seen nesting under the eaves of dwelling-houses. The plumage of the male is chestnut-brown, the crown and forehead black or slaty-blue, and the chin and breast pale red. The female is ashy-brown, shading to olive-yellow, the wings being pied with white. To this group also belong *Chrysomitris tristis*, or yellow-bird, a lively, graceful bird common to the United States and to Canada; also its European sister, *C. spinus*. The *Linaria cannabina*, or common linnet, is also a member of the F. tribe, and inhabits most parts of Europe, ranging eastward as far as Central Asia. The *Montifringillia nivalis*, or snow-finch, and the *Erythropsia githagina*, or desert F., are rarer and even more beautiful varieties. The *Petronia domesticus*, or house sparrow and its allies, are true Fs.; so are the *Serinus hortulanus*, or serin F., and the *S. canarius*, or familiar yellow canary. The *Pyrrhula rubicilla*, or bullfinch, is another in-

habitant of the British Isles. A further sub-order of the F. family is the *Emberizina*, or buntings, which inhabit the northern parts of the Old World, and some parts of India.

Finch, Heneage, first Earl of Nottingham (1621-82), an Eng. jurist, was educated at Westminster School and Christ Church, and afterwards joined the Inner Temple. In 1660 he became solicitor-general, and the following year he entered parliament. When Shaftesbury was dismissed he was made Lord Keeper of the Seals (1673), and next year was promoted to Lord Chancellor. F. was a zealous churchman, declared in the House that government by bishops was inalterable, was vehemently opposed to Charles's Declaration of Indulgence (1663), and eagerly supported the Five Mile Act (1665). Burnet testifies to his forensic powers, and says that he was 'well versed in the law,' but mentions also that he was ill-bred and vain. The high repute in which his contemporaries held him is shown by the fact that he framed for the Commons their congratulatory address to Charles on his coming to England.

Finchley, a healthy and popular residential district of Greater London, England. It lies 7 m. N.W. of St. Paul's Cathedral, in the Hornsey division of Middlesex, and has two stations, Church End, Finchley, and E. Finchley on the L.N.E. Railway. F. Common is now built over, but it was once notorious because here Dick Turpin and Jack Sheppard were apt to waylay travellers by night. Pop. 46,719.

Finck, Henry Theophilus (1854-1926), musical critic to the *New York Evening Post* and *Nation* 1881-1923; studied philosophy at the University of Harvard (1872-76), and, having gained the Harris fellowship, pursued his studies at Heidelberg and Berlin (1878-81). Among his many publications are *Wagner and his Works*, 1893; *Greig and his Music*, 1909; *Massenet and his Operas*, 1910; *Richard Strauss*, 1917; *Musical Progress*, 1923; *Musical Laughs*, 1924. Died Oct. 1.

Findlay, a city and cap. of Hancock co., Ohio, U.S.A., and lies 44 m. S. of Toledo. It stands on the oil and natural gas districts of Ohio and carries on large manufactures of glass, machinery, pottery, brass, and steel. Pop. 19,363.

Findlay, Sir George (1829-93), a railway manager, b. at Rainhill in Lancashire, and was the son of an inspector of masonry. After various other appointments he became in 1849 an engineer on the Birkenhead Railway. After superintending the

making of the line between Shrewsbury and Ludlow—which was extended to Hereford in 1853—he came into contact with the London and North-Western Company, who had taken over the line. In 1864 he became general goods manager to this railway, and ten years later chief traffic manager, while in 1880 he was made general manager. He was made A.I.C.E. in 1874, and was knighted in 1892. He wrote *The Working and Management of an English Railway*, 1889. The 5th edition (1894) contains a biographical sketch by S. M. Philip.

Findlay, John Ritchie (1824–98), a newspaper proprietor, *b.* at Arbroath. He began his career in the office of the *Scotsman*, afterwards becoming owner of most of the property. He gave the Scottish National Portrait Gallery to the nation at a cost of £70,000.

Fine: (1) A pecuniary penalty payable to the state for an offence against the Criminal Law. It may be super-added to imprisonment or be the sole punishment. Other than the prohibition of excessive F.s. contained in the Bill of Rights there is no restriction in the amount of a F. for such indictable offences as may be so punished. Felonies are not often punished by F. only, being as a rule of too grave a nature (*see CRIMINAL LAW*). Any misdemeanour under the Criminal Consolidation Acts, 1861, may be punished by F. in addition to or in lieu of other punishment. The following offences *inter alia* are punishable by F. in addition to or in lieu of imprisonment: offences against the Foreign Enlistment Act, pound breach (*see BREACH*), embracery (*q.v.*), maintenance (*q.v.*), champerty (*q.v.*), misprision of felony, contempt of court (*q.v.*), riot, rout, unlawful assembly, challenge to fight, common law conspiracy (*q.v.*), indecent conduct, false imprisonment, cheating, and forgery at common law. In the following F. is an alternative only: smuggling; attempting to obtain by false pretences. The punishments are cumulative in the following: seditious libel, blasphemy, and compounding felony. Under the Summary Jurisdiction Act, 1879, a court of summary jurisdiction, in cases where it has power to imprison on a summary conviction, notwithstanding that it has no express power to impose a fine in any such case, may in its discretion impose a fine not exceeding £25 instead of imprisonment. Under the same Act both an English and a Scottish court of summary jurisdiction may, where it imposes a small fine, *i.e.* one not exceeding 5s., allocate the F. or any part of it towards the payment of the informant's costs. The mode of enforcing the payment

of a F. is by distress and sale of the goods of the person convicted. (2) A collusive action at law (*see FINES and RECOVERIES*). (3) In the feudal system of land tenure denoted an agreement between a lord and his vassal prescribing the conditions of the latter's tenure; or a sum paid by a villein tenant to his lord for the privilege of giving his child in marriage. (4) A sum paid to the lord of the manor by a person on his admission on the rolls of a manor as owner of a copyhold estate. They are now fixed at two years' improved value, *e.g.* if A enters as tenant at £50 a year he pays £100; if he improves the land to the value of £100 a year, B, the next admittee, must pay £200. In many cases this archaism of the feudal system eats up practically all the interest of the admittee, and involves a gratuitous hardship in the case of persons who are merely succeeding to the estates of their parents. It is the more unjustifiable in that in most respects the rights of a lord of the manor are now divested of all their former meaning or substance. (5) A sum paid for the renewal of a lease. Under the Settled Land Acts F.s. received on leases made by a tenant for life under his statutory powers must be applied as capital money for the benefit of the reversioners or remaindermen.

Fine Arts may be divided into two groups—the greater arts, which are sculpture, painting, architecture, poetry, and music; and a group of lesser arts, among them acting and dancing. The name *F. A.*, with its French equivalent *beaux arts*, and its Italian *belle arti*, is given to these arts by reason of their fostering the love of the beautiful, although they may at the same time be useful—thus there are other minor arts which may be classed as fine if they fulfil the former condition. Among these is the work of the goldsmith, the potter, and the weaver, all of whom produce decorative as well as useful wares. Though in its widest sense the term 'Fine Arts' embraces poetry, music, dancing, and the drama; in its more usual and restricted sense it comprises only the three sister-arts of painting, sculpture, and architecture. The work of art, according to Hegel, is 'a product of human activity and is made for man.' Its primary appeal is to his æsthetic sense; this is, indeed, its actual *raison d'être*, and the fact that it may add to his comfort or convenience, as in the case of an architectural work of art, in no way adds to its artistic importance. While philosophers do not attempt to decry the beauties of nature, they look upon them as being of a lower order than those which are

classed under the heading of Fine Arts; for as Hegel puts it, 'the beauty of art is the beauty that is born of the mind; and by as much as the mind and its products are higher than nature and its appearances, by so much the beauty of art is higher than the beauty of nature.' The crude beginnings of the arts of painting, sculpture, and even architecture are found in very early times in the rough sketches scratched on prehistoric caves, in rude stone carvings, and in the erection of mounds of stone. For articles on each of the Fine Arts, see under individual headings. A good introductory text-book to the study of this subject is *The Fine Arts*, by Professor G. Baldwin Brown, 1916.

Fines and Recoveries. These were fictitious or collusive actions at law, which were mainly instrumental in conveying land in spite of certain legal restrictions. Both were notoriously in use as a means of barring the entail (*q.v.*) of estates, thereby enabling the tenant in tail to sell the lands so as to defeat the rights of his own issue and of the remaindermen and reversioners (see *DE DONIS, ENTAIL*), while the common recovery was as constantly invoked to elude the Statutes of Mortmain (see *CHARITABLE USES*). A fine (*Lat. finis*, end) was formerly a common mode of transferring any freehold. Originally founded on an actual suit, it became later nothing more or less than an amicable compromise of an action, real or fictitious, whereby the lands which formed the subject of the action were acknowledged to be the right of one of the parties. It was so called because it put an *end* not only to the suit but also to all other suits concerning the same matter. The end (*finis*) of it was to bar issue, but not remainder or reversion, and instead of fee simple it created a 'base fee' lasting only as long as there were issue of tenant in tail, but allowing a remainderman or reversioner to come in upon the extinction of such issue. The steps in the solemn farce were briefly—(1) the intended purchaser brings an action founded on the supposed breach of a contract to sell to him; (2) the crown then took its perquisite in the shape of a *primer fine*; (3) the court for a further fine called 'King's silver' then gave leave to the parties to settle the suit (*licentia concordandi*) on the assumption that the defendant knowing himself in the wrong had been making overtures; (4) then the *concord* or agreement was drawn up which contained the acknowledgment by the defendant that the lands belonged to the plaintiff; (5) lastly, came the *note* of the fine or abstract

of the concord naming the parties, the parcels (see *CONVEYANCING*) of land, and the agreement, and the *foot* of the fine reciting the parties and date. Engrossed deeds or copies of this note and foot delivered to the parties constituted the title deeds to the property. The effect of the fine was that the right of all strangers to the suit was barred, unless claim was made within five years. The common recovery was an invention of the ecclesiastics designed to enable them to hold land, notwithstanding the prohibition of conveyance to a corporation. It was an action actual or (generally) fictitious, in which the lands were *recovered* against the tenant of the freehold, the judgment so obtained binding all persons and vesting an absolute fee-simple (*q.v.*) in the plaintiff. In regard to estates tail the common recovery was first employed in Taltarum's historic case, and its effect was to defeat the rights not only of the issue of the tenant in tail, but of remaindermen and reversioners (*q.v.*) as well. The steps in this other piece of transparent juggling were much more complicated. The intended purchaser (P) first brought an action against the freehold tenant (T), alleging that T had no title to the land, but that he had come into possession after one (B) had turned him (P) out. Then T appeared on the scene and called upon C who was supposed to have warranted T's title, to defend his (T's) title. This was called the vouching to warranty. Then C appeared and took the place of T as defendant; whereupon P asked the court for leave to settle the matter privately with the vouchee (C). P then came back into court, but C made default with the result that judgment was given against him. The cryer of the court usually played the part of the vouchee. He was an especially fit person, because having no lands of his own, the judgment which T obtained against him to recover lands of equal value to those successfully sued for by B was nugatory. And this supposed recompense in value was the reason why the issue in tail and remainder were barred by a recovery. Both F. and R. were abolished by the Fines and Recoveries Act, 1833. See *ENTAIL*.

Fingal, the leader of the Fingalians, see *FINN*.

Fingal's Cave, see *STAFFA*.

Finger Prints, the patterns formed by the minute ridges on the fingertips differ in each individual; and not only do those which appear on the fingers of the new-born child remain unchanged throughout its life, but those of no two fingers of the same

individual have ever been found the same. It is this curious physiological fact that led to the idea of a system of identification of persons apprehended by the police by F. P. The system owes its practical application in this country to the ingenuity of Sir Edward Henry, who, when Inspector-General of Police in the Lower Provinces of India, perfected an effective system of classification of F. P. This system had been successfully adopted for some years by the government of India before being adopted by the police of England and Wales in 1901. It is also in vogue in many other European countries, and is generally regarded as the simplest, speediest, and most certain means of identification, and has for many years entirely taken the place of the anthropometric or Bertillon method of taking measurements. The success of the F. P. system depends entirely on the simplicity and accuracy of the classification of the prints. To be of practical value a classified F. P. slip should be available at any time for comparison where a similar one is brought for purposes of identification. Further the system has often afforded valuable evidence of the commission of crimes, finger marks unwittingly left on window-panes, doors, walls and papers betraying the identity of burglars, housebreakers, and other offenders. The existing orders of the Home Office provide for the registration by F. P. of all persons convicted at Quarter Sessions and Assize, and sentenced to a term of not less than one month's imprisonment, or at any petty sessional police or stipendiary magistrate's court to more than one month's imprisonment without the option of a fine, for the commission of any of a number of specified offences, including arson, bankruptcy offences, burglary, coining, conspiracy, embezzlement, entering with intent to commit felony, extortion, false pretences, forgery, indecent assault upon females, fraud, housebreaking, killing or maiming cattle, larceny, malicious injury, possessing housebreaking tools, receiving, robbery, shopbreaking, etc. But all persons sentenced in the First Division or Second Division are exempt from the order if they have not been previously convicted. Persons coming within the order are 'finger-printed' by the warder staff at the prisons where they are confined, and the slips containing their F. P. are then sent for registration and record by the governors of the prisons to the Habitual Criminals' Registry, New Scotland Yard. Prison governors or officials are authorised to take F. P. of remanded prisoners, and these officials may use such force as may

be necessary for the purpose. But no similar power is conferred on the police, and if a prisoner in the custody of the police declines to be finger-printed, the police should apply to the governor of the prison to which the prisoner is remanded.

It may be noted here that the utilisation of F. P. is not restricted in India to the Police Department. It has been introduced into all depart-



FIG. 1—ARCH

ments of public business, being particularly useful where the people are ill-educated, and where false personation is rife.

The method of taking what are officially termed 'rolled' impressions of finger patterns is to roll the prisoner's finger on an inked metal plate mounted on a wooden block



FIG. 2—TENTED ARCH

and then to repeat the rolling operation on a paper form marked into ten spaces for the reception of the impressions of all ten digits. In rolled impressions it is the *delta* or point of divergence of the ridges after running parallel for a certain distance that is of such importance. In taking plain impressions the *delta* is ignored, but otherwise the detail is essential. After these operations are completed

the prisoner signs the slip or form. The right hand specimens are whorls, the left hand are loops exclusively, the slope of the stroke indicating the direction of the loop. The object of the 'plain' impressions taken simultaneously is to ensure the printing of the digits in their proper sequence;



FIG. 3—LOOP

the plain impressions acting as a simple but completely effective check. Fig. 1 above is an enlargement of the 'arch' type; Figs. 2, 3, 4, and 5 are enlargements of the other three types, 'tented arch,' 'loop,' 'composite,' and 'whorl.' The 'delta' is marked with an arrow-head in Fig. 3. There are two deltas in whorls and composites, one in a loop, and none in an arch. Where the police find



FIG. 4—COMPOSITE

clear impressions in the scene of some crime they are expected to take photographs of the same as quickly as possible and send them to New Scotland Yard, when the photographs will be developed, and, if necessary, enlarged and properly prepared for production in evidence.

Each delta or point of divergence is marked by an arrow-head. Fig. 5a represents the ridge course traced from delta to delta. These deltas are all-important in comparing F. P. Any two F. P. may display one or two ridge characteristics in common, but

the greater the number of characteristics taken the less the probability of mere coincidence. It is easy to establish that the probability of, say, any ten specially noticed characteristics in an impression occurring by chance in the impression of any other digit is $\frac{1}{4} \times \frac{1}{4}$ nine times, or



FIG. 5—WHORL

$(\frac{1}{4})^{10}$, i.e. odds against all these similarities being found in two impressions, not those of the same digit, is over a million to one.



FIG. 5a

In primary classifications arches and composites occurring relatively infrequently are included under loops and composites under whorls. Given an accurate classification number or formula, a card properly located can readily be found in the bureau when wanted for comparison with the impressions of a suspect.



THUMB

Classification can be simplified by the arithmetical rule for determining primary and secondary or sub-classification and sub-divisions by ridge counting and ridge tracing. Secondary classifications are necessary to



MIDDLE FINGER
RIGHT HAND

break up large accumulations of primary classifications into groups of convenient size. Sub-classes are therefore formed by reference to the occurrence of arches, tented arches, and *radial* and *ulnar* loops. (A loop is *ulnar* (U) when the downward



MIDDLE FINGER



LITTLE FINGER
LEFT HAND

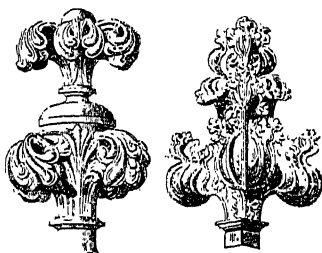
slope of the ridges about the core is from the direction of the thumb towards that of the little finger; and *radial* (R) when the direction is reversed.)

To-day the collection of F. P. slips in the Registry numbers upwards of a quarter of a million and includes those of practically all habitual criminals. 'Habitual criminals' in this context has a wider than the technical meaning (as to which see under CRIMINAL LAW), and includes all previously convicted persons. If no previous conviction is traced at the Habitual Criminals' Registry against a remanded prisoner, the slip is retained until the issue of the trial, according to which it is either registered or destroyed. See Sir Edward Henry's *Classification and Uses of Finger Prints*, 1913; Vincent's *Police Code* (15th ed.).

Fingers, Deformities of, see MANUS.

Fingos, Fingo, Fengu, or Amafingu, a Bantu tribe formed from the Kaffir tribes which have been broken up. They inhabit the southern region of Cape Colony and are looked down upon by the other Kaffir tribes. They have always remained loyal to the British people by whom they are protected, and a number of them profess to be Christians.

Finial, the term applied to an ornament in architecture, used specially in the Gothic style. It was carved to



FINIALS

represent foliage and terminated pinnacles, gables or spires. Though used earlier it was elaborated by about the twelfth century, and during the next two or three centuries the foliage of the leaves was imitated carefully.

Finiguerra Maso, or Tomaso (c. 1410-c. 75), an Italian sculptor and goldsmith, b. at Florence, and is supposed to have been taught by Lorenzo Ghiberti. He was especially skilful as an engraver on metal—one piece of his work which still exists being very beautiful, 'The Coronation of the Virgin,' which is now in Paris.

Fining, the name given to the process of making clear certain liquors. The F. is mixed with some of the liquor and is then added to the whole amount.

Finistère (Land's End), the most westerly dept. of France, with an area of 2730 sq. m. It is bounded by the English Channel, Atlantic Ocean, and the depts. of Côtes-du-Nord and Morbihan. The coast is bold and rocky, with lofty cliffs of granite; the Pointe de Raz is the most dangerous headland. The interior has two chains of hills, stretching parallel from E. to W.—the Mt. Arrez, and the Noires; these are clothed with forest trees and heathland, while rich meadows and fertile valleys lie between. The climate is temperate with W., N.W., and S.W. winds. Over a million acres are under cultivation, and the crops are wheat, rye, barley, oats, potatoes, flax, mangold wurzel, etc.; fruit and vegetables are exported. The grass lands are very extensive, horse and cattle breeding being an important industry. The mineral wealth is not great; coal and iron, lead, bismuth, and zinc are obtained, and granite, marble, and slate are quarried. The arrons. of Quimperlé, Brest, Châteaulin, Morlaix, and Quimper are contained in the dept. Quimper is the capital, and Brest, the largest town, is a military station. The manufs. are woollens and linens, sail-cloth, rope, paper, shipbuilding, etc. Pop. (1926) 753,700.

Finistère, Cape (derived from Lat. *Finis terræ*, end of the land), a cape on the N.W. coast of Spain, in lat. 42° 52' 45" N., and long. 9° 15' 32" W. belonging to the prov. of Galicia. It extends into the Atlantic Ocean, and is the projection of a mountain height which rises about 2000 ft. above sea-level. The cape can be seen from vessels seventeen leagues out; a lighthouse is placed in a conspicuous position. The English gained a naval victory off F. in 1747, when Anson defeated the French *Jonquière*; twelve French men-of-war and six other vessels were captured by the British. In the same year Rear-Admiral Hawke defeated the French, and took six men-of-war. Again, in 1805, Calderan Strahan gained a victory over the French and Spaniards.

Finite, a term used in mathematics, and applied to an integral which can be expressed without an infinite series.

Finland (Finnish *Suomi*, or *Suomen maa*, 'the land of fens and lakes'), a republic of N. Europe. It is situated between the Gulfs of Bothnia and F., and is bounded on the N. by Norway, and on the E. by Russia. Its greatest length is 717 m., and its greatest

breadth 370 m.; its land area is 132,608 sq. m.

The coast-line of the country is deeply indented, like that of Sweden, and there are clusters of numerous small islands. The interior is occupied by a labyrinth of large lakes and rocky basins filled with water, which are divided by low and flat hills and united artificially by means of canals. The chief lakes are Lake Saima, drained by the Vuoksen over the famous Imatra Falls into Lake Ladoga, only the northern half of which belongs to F.; Enare, Näsijärvi, Pyhäjärvi, Uleå-träsk, and Pajanne. The principal rivers are Torned, Kemi, Uleå, Tana, and Kymmene. South F. is watered by a number of short rapids, which are of use for working mills, and to some extent for internal navigation. Lake Saima is connected with the Gulf of B. by a sluiced canal 36 m. in length. The surface of the country is flat, the highest mountain being Haldefjäll (4126 ft.), in Lapland. In the S. the highest is Tuirismaa (754 ft.). Three-fifths of the land-surface is covered with forests, which yield valuable timber.

The minerals of F. are very limited. No coal is found, but about 22,000 tons of cast-iron are obtained annually, and there is also a small output of copper and silver. Some gold is found on the Ivalojoiki, in Lapland, and very fine granite is quarried from the Piterlaks mines. The surface of the country consists of such primitive rocks as gneiss, gabbro, and diorite. Cambrian, Silurian, and Carboniferous deposits are found along the coasts of Lake Ladoga and the Gulf of Finland.

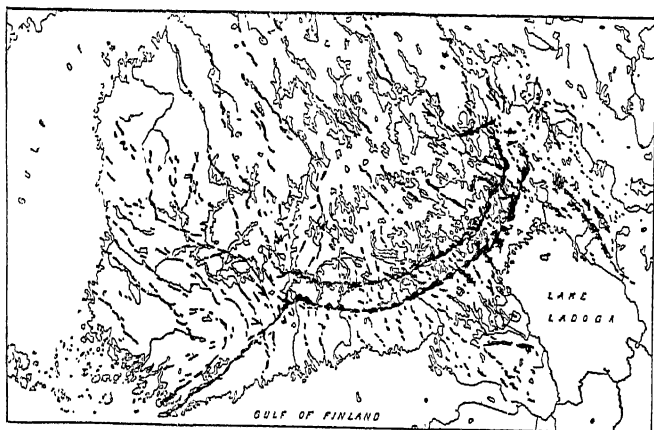
Agriculture is the chief industry of the majority of the population, though only about 6 per cent. of the land is cultivated. Rye is the chief crop, but barley, oats, wheat, hay and potatoes are also grown. Butter and all kinds of dairy produce are exported in large quantities. The state encourages scientific training and provides twenty-six instructors for the agricultural and horticultural schools. Currants, strawberries, and raspberries are grown with great success, and the apple, pear, and cherry tree are cultivated in the S. Fishing is a prosperous industry, salmon, trout, perch, etc., abound in the lakes and rivers, and a kind of herring is caught off the south-western coast. The manufacturing industries include paper, chemicals, tobacco, cellulose, leather, textiles, machinery, etc., and there were in 1928 over 600 saw-mills. The chief exports are wood-pulp, timber, cardboard, hides, pitch, and agricultural and dairy produce. The

many lakes, connected by canals, form an important system of internal communication. There are also nearly 10,000 m. of high road, and 3232 of railway.

The climate of F. is very severe during the winter, even along the S. coast, where it varies in January between 20° and 30° Fahr. However, owing to the south-westerly and westerly winds, and to the proximity of the sea, the climate is less rigorous than it is farther E. in N. Russia. The winter lasts many months, and frosts have been known to destroy the crops as late as June. The ground is usually covered with snow from the middle of

Representatives consisting of one chamber of 200 members. Women have been enfranchised since 1907 and are eligible for the House of Representatives. Finland was thus the first country to concede women suffrage. There is compulsory military service, the strength of the army being about 25,000 men; there is also a volunteer organisation of Civic Guards (10,000 strong) for home defence.

The population in 1928 was 3,611,791. The bulk of the inhabitants are Finns, a people of Uralo-Altaic stock. The rest of the population is made up of Swedes, Lapps in



This figure shows part of the Lake district of Finland, which owes most of its physical peculiarities to former ice-work. The whole country has been worn down almost level by the ice-sheet, which has left long moraines running N.W.-S.E., and chains of lake basins following the same general direction. The black lines on the diagram show these morainic deposits. Notice the great festoon of terminal moraines (*asars*) running at right angles to the rest.

November till late in April. In June, July, and August the days are very long, and the weather dry and sultry. The annual rain at Helsingfors is 20 in. and along the southern coast 25½ in. Helsingfors, Abo, and Hango are the only ports open during the winter.

Education in F. is very advanced. There is a university at Helsingfors, which in 1929 had 4609 students, 1623 being women, and two at Abo. Helsingfors has also one technical and two commercial schools. There are a number of polytechnic, commercial, nautical, and agricultural schools. The country is governed by a president, elected for 6 years, a Council of State, chosen by him, and a House of

the N., Russians, and Germans. The vast majority of the population is Lutheran, but there is complete religious toleration. Finnish is the language, but Swedish is understood in the chief centres, and is generally spoken in the Åland Is. Helsingfors (now known as Helsinki), with a pop. in 1928 of 227,375, is the capital; other important towns are Abo, (now Turku), pop. 63,918; Tammerfors (Tampere), pop. 54,015; and Viborg (Västerås), pop. 54,120.

The Finns are said to have settled in F. during the eighth century, having been expelled from their home by the Volga. Until the twelfth century they were pagans, when they

were conquered by Swedes and adopted Christianity. They remained a dependency of Sweden for 500 years, but enjoyed autonomous government. Russia repeatedly tried to seize the country from Sweden, and in 1721 by the Treaty of Nysad, Peter the Great won that part of F. which forms the province of Viborg. In 1743, by the peace of Åbo, Elizabeth extended the Russian frontier to the Kymmene. In 1809 Sweden ceded the rest of the country with the Åland Islands to Alexander I. in the peace of Fredrikshamn. F. preserved its ancient constitution until 1897, when its autonomy was attacked by the Russian government. In 1899 Russia declared her right to legislate on Finnish affairs, regardless of the consent of the Finnish Diet, and between 1900 and 1902 the national Finnish forces were incorporated into the Russian army, and Russian was made the official language of the senate and of the more important public departments. There was great discontent in the country, and in 1904 Bobrikof, the governor-general, was assassinated. In 1905, the Constitutionalists and the Social Democrats formed a coalition, and taking advantage of trouble in St. Petersburg, succeeded in winning certain concessions from the governor-general, Prince Obolenski. The popular demands included the freedom of the Press, the deposition of Russian officials, and the reorganisation of the Diet on a basis of universal suffrage, possessed by every citizen, male or female, over the age of twenty-four (with the exception of paupers). These requests were granted and a single chamber of two hundred members was substituted for the old Diet of four chambers. Trouble was renewed in 1908 when the Russian government again attempted to curtail the powers of the Finnish Diet, and in 1910 the 'Imperial Legislation Law' was passed depriving the Diet of its right to legislate on such questions as the imposition of taxes, police direction, school management, and the control of the Press, which, it declared, affected 'imperial interests.' In 1911 the Russian Duma passed a Bill 'placing Russians on civil equality with the Finns in the grand duchy.'

In 1917, when the Russian Empire broke down, Finland declared itself independent, but Bolshevik aggression led for some time to civil strife. Order was restored and matters finally settled between F. and Russia by the Treaty of Dorpat, 1920.

Consult *Statistisk Årbok för Finland* (Helsingfors, annual); Barnhak, *Russland und Finland* (Leipzig), 1900; J. R. Fisher, *Finland and the Tsars*,

1901; N. C. Frederiksen, *Finland, its Public and Private Economy*, 1902; Mrs. Tweedie, *Through Finland in Carts*, 1897; De Windt, *Finland as it is*, 1903; Renwick, *Finland of To-day*, 1911; *Peace Handbooks*, No. 47 and No. 48; H. Sodehjelm, *The Red Insurrection in Finland*, Eng. trans., 1919.

Finland, Gulf of, the eastern arm of the Baltic Sea, having Finland on its northern shores, and Russia and Esthonia to the E. and S. Its length is 260 m.; breadth, 25 to 90 m. Into it flow the Neva, draining the great lakes, Onega and Ladoga, and the Narva, draining Lake Peipus. It is connected with the Saima Sea, by the Saima Canal. The Finnish coast of the gulf is very dangerous, owing to the shoals and islands. The water is slightly salt, and not very deep, being covered with ice for about twenty weeks in the year.

Finlay, George (1799-1875), an historian, was b. at Faversham, in Kent, and was the son of Scottish parents. He began by studying law first at Glasgow and after at Göttingen, but in 1823 visited Greece where he made the acquaintance of Lord Byron, and spent his time in a careful study of the language and history of that country. He was compelled to go to Rome on account of his health, but after visiting Edinburgh he returned to Greece, where he spent the rest of his life. He was active in the establishment of the independence of that country, but was unable to make any progress in the system of agriculture. Most of his time was spent in writing the history of Greece, the first part of which, *Greece under the Romans*, was published in 1844. He wrote also *History of the Byzantine and Greek Empires from 716-1453*, 1854; *History of the Greek Revolution*, 1861. In 1877 the Rev. H. F. Tozer issued another edition of his history.

Finlay, Sir Robert Bannatyne, G.C.M.G. (1842-1929), a lawyer, was b. in Edinburgh. He was called to the Bar in 1867. From 1885-1906 he was M.P. for the Inverness Burghs, and was elected for Edinburgh and St. Andrews Universities in 1910. He became Solicitor-General in 1895 and Attorney-General in 1900. In 1916 he became Lord Chancellor in Mr. Lloyd George's administration. In 1918 he retired and in 1919 was created Viscount Nairn. Appointed in 1920 British member of the Permanent Court of Arbitration at The Hague and the year after became a member of the Permanent Court of International Justice set up by the League of Nations.

Finn, **Fioun**, **Find**, or **Fingal**, whose name was Find MacCumail, was in

Irish legend the leader of the Fiaun, Feinne, Fingalians, or Fenians, which was a militia formed of people from all parts of Ireland. Tradition says that he was the son of Cumail who lived in Ireland during the second century A.D. Those who were admitted to this band had to fulfil conditions which were very strict and which inquired into their mode of living with great scrutiny. Among the many heroes of these people were Oisíon—generally known as Ossian—who was his son; Oscar his grandson, and Diarmait. Goll and Conan were members of a rival branch of the family and constant feuds took place between them. After the death of Cormac MacArt, and during the time of his son and successor, Carboy, their power was at its height, and they were eventually totally defeated at the battle of Galtra, or Gavra, A.D. 283. It is said by some that Ossian escaped with his life. The stories of the Feinne and of their leaders form the subject of some of the later heroic literature of Ireland. See Alfred Nutt, *Ossian and the Ossianic Literature*, 1899.

Fins are organs extending from the bodies of aquatic animals, which help them to propel themselves through the water. In the case of fish they may be paired F. or median F., the former including pectoral and ventral F., and the latter caudal and dorsal F., these F. being supported by a series of bony rays. The F. in cetaceans are simple extensions of the soft tissue and have no bony rays. The term may also be applied to other aquatic animals, as in the case of the tadpole's tail. Among the invertebrates any expanded part of the body which helps in swimming is termed a F.

Fins, a race of people of northern Europe inhabiting various countries, including Finland, Lapland, parts of the Baltic and the banks of the Volga, parts of Russia and Western Siberia. They belong to the Ural-Altaic race, originally inhabitants of parts of Asia themselves, and their name is identical with the classic 'Feinne.' From the time of their migration to Europe they have been subject principally to the Swedes and Russians. Most of them now, however, lead a settled life, being engaged in the pursuit of agriculture or fishing, though a few prefer a wandering life. They are of strong and robust physique, having rather a low stature, flat features, and fair or reddish hair. They are also brave, straightforward, and hospitable, and most of them have adopted the Christian religion. See U. S. Urjö *Koskrusen Finsische Geschichte von den frühesten Zeiten bis auf die Gegenwart*, 1874; and *Finland in*

the Nineteenth Century, of various authors.

Finsbury, a metropolitan bor. of London, England, bounded S. by the City of London, W. by Holborn, E. by Shoreditch, and N. by Islington. Among the numerous places of interest are the Charterhouse, formerly a Carthusian monastery; Bunhill Fields, the burial place of Daniel Defoe, John Bunyan, and other eminent persons, and in the near vicinity many victims of the plague were interred. S. of Bunhill Fields is the Artillery Ground, which since 1683 has belonged to the Honourable Artillery Company, with barracks and armoury. The principal industry of the borough is watch-making, and working of precious metals; there are also large printing works. F. returns one member to parliament. Pop. 76,109.

Finsbury Park, a dist. which forms a suburb of N. London, situated 4 m. N. of St. Paul's. It consists of the ecclesiastical parishes of St. Thomas, and St. John. Finsbury Park, from which the district derives its name, covers over 121 acres. It is horticulturally well arranged, and affords fine views. It is well planted with trees and shrubs, contains large conservatories, and an artificial lake, which is used for pleasure boats. A small portion of the park is reserved as a gymnasium for children.

Finsen, Niels Ryberg (1860-1904), physician, b. in the Faroe Isles, and took his degree in medicine at Copenhagen, where he lectured on anatomy. It was here that he discovered the effect of light upon certain diseases and made use of his discovery in the treatment of these diseases. He advocated the exclusion of the chemical rays from people suffering from small-pox, maintaining that this prevented the pustules from suppurating, and used the ultra-violet rays for curing certain diseases of the skin, for example, lupus. For this process he invented a lamp which collects the light by means of a quartz lens and also provides for cooling it. In 1903 he was the recipient of the Nobel prize. He wrote *Chemical Rays and Variola*, 1894, and *Phototherapy*, trans. from the German by J. H. Sequeira, 1901.

Finsteraarhorn, the highest peak of the Bernese Alps, in the canton of Bern, Switzerland, about 40 m. S.E. of Bern; it attains a height of 14,025 ft., and is one of the principal tourist centres of Switzerland. It was first climbed by guides in 1812. Herr Sulger ascended it in 1842.

Finsterwalde, a tn. of Prussian Germany, situated on the Shackebach, 23 m. S.W. by W. of Cottbus. In 1635

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it came into the possession of Saxony, and in 1815 of Prussia. There is a Gothic church of 1581, also a château and schools. The manufs. are cloth, cigars, and there are iron foundries and flour mills. Pop. 11,000.

Fin-whales or **Rorquals**, also called **Fin-backs** or **Razor-backs**, constitute the *Balenoptera*, a genus of Cetacea. They are characterised by their elongated shape, short and recurved back-fin, and a number of longitudinal folds in the skin of the throat. The F. are the most widely distributed of all whales, being known in all but the extreme Arctic and Antarctic seas; their scarcity of blubber and inferior

to the shore and the sides are often lined with waterfalls. They may have been formed by the constant wearing away of the rocks, the fissures being filled with sea water, or by the action of a glacier, the pressure of the ice deepening the valleys. F.s. are found in Norway, Iceland, Greenland, parts of the American coast and New Zealand. Those of Norway are among the most notable; Sogne F., one of the largest, being 100 m. in length, and Hardanger F. only a little more than half that length. Christiania and Trondhjem are also well known.

Fiorillo, Johann Dominik (1748-1821), a Ger. painter and writer



[D. McLeish

THE AURLANDS FIORD, ONE OF THE GRANDEST IN NORWAY

whalebone has secured them a certain immunity from the whaler. *B. sibaldi* is the largest of all living animals, sometimes attaining a length of 80 or even 85 ft.; it spends the winter in the open sea and approaches the coast of Norway about the end of April. *B. muculus*, the common F., is found in the seas of N. Europe, and occasionally enters the Mediterranean, its length is from 60 to 70 ft. *B. rostrata*, sometimes called the pike-whale, because of its pointed muzzle, is the smallest species, varying from 25 to 30 ft. in length; it frequents the Norwegian fiords in summer, and is by no means rare on the British coast.

Fiord, or **Fjord**, a narrow inlet of the sea, having high coasts on either side, and cutting far into the land. These F.s. which are found on mountainous coasts, are exceedingly deep, the deepest part being that nearer to the land, while the bottom shelves up

to the shore and the sides are often lined with waterfalls. They may have been formed by the constant wearing away of the rocks, the fissures being filled with sea water, or by the action of a glacier, the pressure of the ice deepening the valleys. F.s. are found in Norway, Iceland, Greenland, parts of the American coast and New Zealand. Those of Norway are among the most notable; Sogne F., one of the largest, being 100 m. in length, and Hardanger F. only a little more than half that length. Christiania and Trondhjem are also well known.

Fiorin Grass, see BENT GRASS.

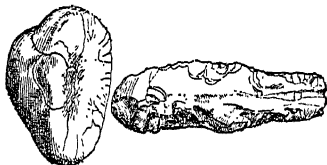
Fir, strictly speaking, is the popular name for *Abies*, a genus of conifers, but the genus *Picea* and others are often included. The leaves are needle-shaped and in *Abies* have a rounded base; those of *Picea* are decurrent. *Abies* cones are erect and when ripe the scales fall off leaving the upright axis standing alone; the cones of *Picea* are pendent. *A. pectinata* is the silver F., *P. excelsa*, the Norway spruce, both of which trees are commonly cultivated, but the latter flourishes in severe exposed situa-

tions, and is widely distributed over N. Europe. The timber of this tree constitutes deal, and the trunks are used for masts, etc. There are many valuable products from other members of the order, e.g., gums, resins, pitch, etc., and *A. balsamea* yields canada balsam.

Firdausi, Firdousi, Firdusi, Ferdousi (c. A.D. 940–c. 1020), Persian poet. He assumed this *nom de plume*, his real name being Abū'l Kāsim Mansur or Hasan, and is the author of the Persian epic *Shāhnāma*. He was b. at Shadab, near Tus. The source of his work was a history of Persia which, unlike other books, was preserved by the Caliph Omar, and Dakiki, the court poet of Mahmud, Sultan of Ghazni, was ordered to put it into verse. On his death the work was taken over by Firdausi. It was agreed by the sultan that he was to have 1000 gold coins for every thousand verses. When the book was finished, the labour taking over thirty years, silver instead of gold was sent to F. owing to the jealousy of the sultan's minister. The poet in anger wrote a satire on the sultan, and was afterwards compelled to flee from place to place. He went to Mazandoran, thence to Bagdad, and finally to Tus, where he died. The chief editions of the poem are: Turner Macan, 1829; Julius von Mohl, published with a translation into French; J. A. Valliers, and S. Landauer, 1877–83; A. G. and E. Warner, 1905.

Fire (O. E. *fyrr*, Gk. *πῦρ*; ultimate root supposed to be connected with 'purify,' cf. Lat. *purus*). Although the statement has been not infrequently made that tribes totally ignorant of F. have been discovered, the evidence on this point is very weak, and it is questionable whether such a race is in existence at the present time. There are considerable variations of detail in the primitive methods of producing F., but they are all based on the principle either of concussion or friction. The simplest form of the latter, rubbing a stick along a groove in another stick, is practised among other places in Tahiti, Samoa, and the Sandwich Is. The stick is twirled round in a hole in the other piece of wood in Australia, Kamchatka, Ceylon, Southern Africa, the W. Indies, N. and Central America, and as far S. as the Straits of Magellan. Concussion has also been known as a means of producing F. from very early times, and such methods as striking two stones together, striking a stone on a piece of wood, or striking two bamboos together, are in use. The employment of a burning-glass is also of

great antiquity; Aristophanes mentions one in *The Clouds*. There are many different legends as to the origin of F. In Greek mythology, Prometheus brings down the torch he had lighted at the sun; Ukko, the Esthonian god, strikes his stone with his steel and sends forth F. in the shape of lightning; in N. American legend F. is struck from the hooves of the great buffalo as he gallops over the prairie, and thunder in the Hindu mythology is the clatter of the hooves of the sun's horses on the sky. Primitive man found it convenient to have a F. always burning in a public building; hence the prytaneum gradually became a religious institution, round which centred also all civil and political interests. The principle of



[Courtesy of British Museum Trustees]

FLINT AND IRON PYRITES FOR STRIKING FIRE (NEOLITHIC)

an ever-burning F. was observed by the Romans, Egyptians, Greeks, Persians, Aztecs, Peruvians, etc. If the F. of Vesta at Rome, for instance, went out, all business was suspended until it had been rekindled with appropriate ceremonies; and no Greek or Roman army crossed a frontier without carrying an altar on which F. from the prytaneum always burned. Because the sun loses force at certain times, the longest day of summer was in many religions an occasion for ceremonious rites connected with F. It was the belief of many ancient philosophers, as the Stoics, that the world would perish by F.; the Scandinavian mythology also mentions this belief, and the Apocrypha (2 Esdras xvi. 15). For further details as to folk-lore, etc., see articles on ORDEAL, PARSEES, and ZOROASTRIANISM; for the physics and chemistry of F. see articles on FLAME, COMBUSTION, FUELS. See also Dupuis, *Origine de tous les cultes*, 1794; Burdett, *Science des religions*; Tylor, *Researches into Early History of Mankind*, 1865.

Fire Alarms consist, generally, of call-boxes placed at frequent intervals along the streets of large towns. The alarm is given by the glass in front being smashed, or the

door being opened, when communication is set up with the fire station. See also FIRE.

Firearms. In this article will be considered the varieties of F. known as small-arms, from their inception until their development into the modern sporting gun, rifle, and revolver; the latter are treated of elsewhere, as is also artillery. At the starting-point the gun is not distinguished from the cannon; in the early days of gunpowder portable F. were often confounded with heavy artillery in Europe. The Flemings anticipated other nations in the use of hand F.; small hand cannons (German *Knallbüschen*) were adopted at Perugia in 1364, and were used at the battle of Rosebecque in 1382. They were generally termed 'sclopo', from which come 'sclopetto' and 'escopette,' and were used by cavalry as early as the end of the fifteenth century, as we find the expression 'equesscoppetarius' used. The hand cannon of the fourteenth century was a rude weapon, made of wrought iron, and fastened to a piece of wood in such a manner that it could not be brought to the shoulder. The touch-hole was at first made on the top of the cannon, with a cover to preserve it from damp; later it was placed to the right of the cannon. Two men were generally required to serve one of these hand cannons. The hand cannon capable of being fired from the shoulder, called in France a 'canon à main à épauler,' is of the same design as the former, but has a roughly-made stock; it dates from the end of the fourteenth century. Varieties of hand cannons in which the match was fastened to the weapon itself (hand cannons 'à serpentín' or 'à dragon' and hand culverins or petrinals) were invented in the early fifteenth century. Hand cannons lengthened by an iron stock and supported by a kind of fork fixed on the pommel of the saddle were also used by cavalry. The invention of the arquebus or harquebus marked the next stage in the progress of portable F. The novelty in this weapon was the appearance of a piece of machinery for firing the priming, an operation which had formerly always been carried out by hand. The touch-hole was pierced at the side of the barrel and above a small pan (bassinnet). This pan contained the priming, and was covered by another hinged plate (couvre-bassinnet). The match was grasped between the jaws of a nipping apparatus (serpentin), and was made to fall on the pan by pressing a trigger. Before the arquebus could be discharged the pan had to be uncovered, the match exactly ad-

justed, and made to burn more brightly, operations which took some considerable time. The barrel of the arquebus was longer than those of its forerunner, being over 3 ft. in length. The double arquebus was a F. which had two match-holders working in opposite directions; it was from 3 to 7 ft. long, and was generally used in the defence of ramparts. A stand on spikes or wheels, called a 'fourquino' was often used for its support. The wheeled or German arquebus (*Radschloßbüsche*) was the first F. fired without a match, and was further distinguished by having a wheel-lock. The match was superseded by the sulphurous pyrites, or marcassite, which was struck by the cogged wheel of the lock and fired the charge. The disc of the lock, which was of steel, was made to revolve rapidly by the pull of the trigger, so striking sparks from the pyrites on to the powder in the pan. This new weapon was not able to oust the arquebus, as its mechanism was much more complicated and liable to get out of order, and the pyrites was very brittle, and easily broken off. The construction and mechanism of the musket, which came into use soon after the arquebus, were precisely similar to those of the latter; it differed only in its calibre and charge, which were both double that of the arquebus. It could be used with either a wheel-lock or match, and its greater size necessitated at first the use of a 'fourquino' (see above). The wheel-lock gun continued in general use until about 1640, the pieces which produced the rotary motion being enclosed within cavities in the stock. In the latter half of the sixteenth century, an invention called the 'chenappan' (from German *Schnapphaha*, a cock pecking), or, as it was corrupted, 'the snaphaunce,' proved to be the forerunner of the flint-lock gun. The change which the lock of the F. underwent by the invention of the flint-lock was very important, though not radical. By this contrivance a gun-cock held in its grasp the flint, which in its fall struck against a movable steel pan-cover. This fell back and left the priming powder in the pan exposed to the sparks generated by the impact of the flint on the cover; the main objection to this method was that the sparks from the flint did not always reach the priming powder. Sometimes, therefore, guns were made having both match locks and flint locks, combined in a method said to have been invented by the Frenchman, Marshal Vauban. The caliver, the fusil, and the musketoon were lighter varieties of

musket; the carbine was a species of caliver with a short barrel but a large bore, whilst the blunderbuss had a still larger bore with a trumpet mouth, and discharged ten or twelve balls at a shot. The flint-lock was superseded in the nineteenth century by the percussion-lock. In this lock the fall of a hammer upon a cap causes the ignition of the charge in the barrel of the gun. The cap is a small copper cylinder lined with a fulminating matter. Alexander Forsyth took out a patent for the percussion gun in 1807, but experiments on detonating materials had been carried out as early as 1699. The fulminates in the percussion cap are obtained from gold, silver, platinum, and chloride of potash. The pistol was at first the diminutive of a hand cannon, and as early as 1364 hand cannons of the length of a 'palma' (about 9 in.) were constructed. A little later came the petronal or petrinial, a kind of short arquebus, which held a place midway between the arquebus and the pistol proper. The barrels of the early pistols were very short, and the stock was almost at right angles to the barrel. The later developments of F. belong to the articles mentioned below, but it is interesting to note that the principles of breech-loading, rifling, and revolving chambers, both in guns and pistols, were discovered at very early times, long before they were utilised as of late years. For further details refer to ARTILLERY, CARTRIDGE, GUN, GUNPOWDER, REVOLVER, RIFLE, etc. See Charles Boutell, *Arms and Armour*; Demm, *Arms and Armour*.

Fireball, the name of one or two kinds of fireworks, formerly used in war for illuminating or incendiary purposes. Of these the ground F. consisted of a sack filled with some brightly burning composition, and pierced with holes. A parachute F. was constructed in a similar manner, but was timed with a fuse and supported by a parachute. Both were fired from a mortar. They are now superseded by rockets (*q.v.*). The name F. is also applied to a certain class of comet, and also to a variety of globe lightning.

Firebote, a term in law used to denote a tenant's right to cut wood for fuel from the land on which he is living. See **ESTOVERS**.

Firebrick, see **FIRECLAYS**.

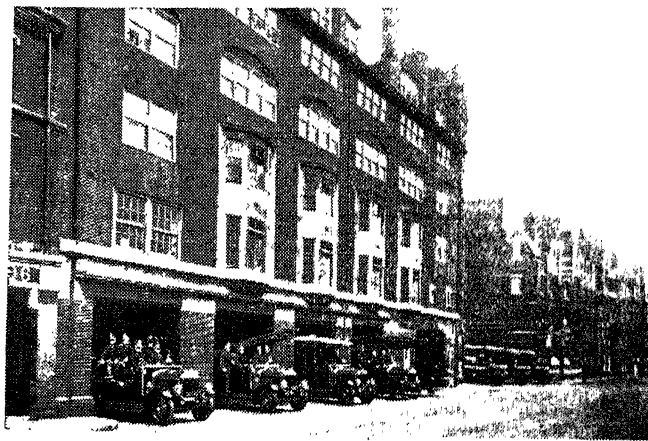
Fire Brigades. Under this heading will be treated the general personnel and equipment of the forces for the fighting against fire which have been organised in every town of any importance of late years. Organised efforts to cope with the ravages of

fire are not by any means confined to recent times, as an organisation for that purpose existed in ancient Rome. The growth of cities, and the inflammability of many building materials, however, have rendered adequate protection essential; this has been rendered possible by the increased efficiency of mechanically-propelled vehicles, in conjunction with well-organised brigades. The salient features of the F. B. of some of the chief cities of the world may be given, London being naturally treated with most detail.

London.—The first efforts at organising a F. B. in London were made by the insurance companies; M. R. Bell Forde of the Sun Fire Office was largely instrumental in forming the first brigade, with funds contributed by various insurance companies, in 1832. This organisation was called the London Fire Engine Establishment; in the first year of its working it had 19 stations and 80 men, the expenditure being £8000; in 1862 the number of men was 127, of stations 20, and expenditure £25,000. As an aid for the above society, the Society for the Protection of Life from Fire was started in 1836; this was supported entirely by voluntary contributions. But generally speaking, in the early part of the nineteenth century, the methods used for the suppression of fire were far from satisfactory. A select committee of parliament was appointed to deal with the matter, and reported that the arrangements made by the parishes, under the Act of George III., were inefficient and altogether lacking in method, with the notable exception of Hackney, which had a well-appointed brigade. As a result of this, the Metropolitan Fire Brigade Act of 1865 threw the responsibility for the provision and maintenance of satisfactory F. B. upon the Metropolitan Board of Works. The funds for this purpose were raised by: (1) A halfpenny rate on the rateable property of London; (2) a contribution from the insurance companies of £35 for every gross £1,000,000 insured; (3) a grant of £10,000 by government. Although the halfpenny rate was made to yield more, by being put on the gross value of property, the yield from all these sources was not sufficient. In 1888 the Local Government Act, which created the London County Council, provided that the expenditure on F. B., etc., should only be limited by the requirements of the case. In 1898 a plan was approved for the additional protection of the metropolis, and this was enlarged in 1901. In 1904, the title was altered

from 'Metropolitan Fire Brigade' to 'London Fire Brigade.' It has a strength of over 2250 and 79 stations, divided into six districts. The headquarters are at Southwark, and are connected with the sub-stations by telephone, and in case of fire any private user of the telephone need only ring up the exchange and give the message 'fire' without looking up the number. There are 1686 fire alarm posts, 100 telephone inter-station lines and over 300 direct lines to important buildings. There were nearly 6000 fires during 1929 of which 36 were recorded as 'serious.'

the work was all undertaken by volunteers; at the time of their abolishment they numbered 163 companies, and 3521 men. In 1865 a Metropolitan Fire District was created; in 1898 the present system was introduced, when a Charter was given to the Greater New York. The electric alarms in the city are all connected with the central fire station which then telephones the local fire station in whose district is the fire. In the outlying districts volunteer help is given; there are 150 stations throughout the city, and 6544 men are now employed.



THE HEADQUARTERS OF THE LONDON FIRE BRIGADE

[L.O.O.]

Paris.—The F. B. of Paris, or *Corps de Sapeurs Pompiers*, is composed of soldiers who are serving their time. An infantry regiment, which is under the command of the colonel, but comes within the department of the prefect of police, is lent by the War Office to the city. The firemen are brought to a high state of efficiency, but the drawback of the system is that the personnel undergoes too frequent changes.

Berlin.—The Berlin F. B. is made up of retired army men, and commanded by military officers. The number of fire stations is 15.

New York has the largest equipment for fire protection of any city in the world. The reason for this may be looked for, amongst other things, in the large proportion of very tall structures, the sudden changes of climate, the use of inflammable furniture, etc. Up to 1865

Fire Engines.—The earliest method of applying water to fires was no doubt by means of buckets or such vessels. This method was, however, improved upon in very early times, for Hero of Alexandria, in 150 B.C., described a fire engine with two cylinders and pistons which were worked by a reciprocating lever. Pliny also refers to the use of fire engines at Rome. Fire squirts or syringes, which were worked by hand, came into use in the sixteenth century, for we hear of them being employed in Augsburg in 1518. At the time of the Great Fire of London, syringes were employed about 3 ft. long and between 2 and 3 in. diameter, which took three men to work them. The next stage in the evolution of the fire engine was a cistern mounted on wheels, with a delivery pipe in the middle, with pumps to force the water through. In 1672 Jan

van der Hyde, sen., and J. van der Hyde, jun., made a flexible hose by sewing together the edges of a strip of leather. The application of this principle made a great improvement, but for many years only manual fire engines were used; these were sometimes constructed of a great size. Mr. J. Braithwaite made a practical steam engine in 1829, but the men of the F. B. objected to their use, and they were temporarily discarded. During the latter part of the nineteenth century the manual type of engine was gradually replaced by a combination of horses and steam engines. The horses, especially trained and very swift, carried to the scene of the fire a trolley, upon which was a steam engine reserved for pumping purposes. These engines were kept in the station with fires bunked down, but in such a way that a good pressure could be obtained by the time the engine had reached the spot. At the commencement of the twentieth century the motor fire engine began to replace this cumbersome arrangement, and soon proved its superiority as a motive power for serving the double purpose of propulsion and pumping. During the last fifteen years fire extinguishing has been worked on a new method. The old theory, that 'water will put out fire,' has given way to the new one that 'driving-pressure will do so more effectively.' This principle has entirely altered the method of estimating an engine's capacity, for though it is still useful to be able to throw a jet or spray to a great height, the tests now applied include those of pressure as well as height. For example, a Leyland type of engine of the largest size is capable of a maximum output of 1150 gallons a minute at 80 lb. pressure to the square inch, on a dead level. With a lift of 10 feet it can exert a maximum power of 200 lb. to the square inch. At this height and pressure it pumps 750 gallons a minute, but given a maximum lift of 27 feet, measured from the outlet of the pump, it can deliver 900 gallons a minute at a pressure of 100 pounds. The modern motor engine carries its own fire escape capable of reaching most modern buildings, as well as other necessities for fire extinction. The tyres with which motor engines are equipped are of special manufacture, as, at all events in cities, no engines carry spare tyres, the theory being that in a large centre it is easier and quicker to replace the engine than to fit a new tyre. Every station is equipped with its fire-bell, and the moment this rings a quiet and almost deserted yard springs into life. From

living rooms and bedrooms above the men slide down polished brass bars that run in wells from the top of the building to the bottom of the building. A plate affixed in a conspicuous place displays a number of metal discs, and one of these has fallen, revealing underneath a street name, e.g. 'Roger Street.' This means that some person has smashed the glass in the Fire Brigade Call Post in Roger Street and given an alarm. A fire-extinguishing outfit is ready for use in a few minutes—perhaps seconds. In case other fires may break out at the same time in the same area, messages are at once passed on to adjacent stations which send supporting engines. F. E.'s also carry hose, first-aid requisites and other gear.

Fire Escapes.—The Turn-Table Fire Escape is a separate contrivance from the escape and ladders carried on the engine, and is especially valuable, in that it does not require any wall for its support, and can be turned about on its revolving base so as to operate from any angle. It serves the double purpose of rescue from fire and of a hose tower, from which a jet of water can be poured. During recent years the Portable Fire Escape has become increasingly used. This consists of a number of ladders, each about 10 feet in length, fitted with projecting hooks which can be driven through a window and fixed firmly to a sill. At the top of each ladder is a hook to which the fireman can securely fasten himself while he secures the next section of the ladder to the window-frame above him. Although it is desirable to use a section for each storey, there is nothing to prevent two men with two ladders making their way to the top of a building of any height. Frequently these ladders are used as extensions of a fire escape should it fail to reach the highest floors of a very tall building. Firemen carry lengths of fine cord about them, for lowering and fastening to a stout rope which is raised and secured to any convenient projection, when it is desirable to improvise a means of escape for an injured person. By drawing the rope outward at an angle of about 45 degrees from the top of the building, a helpless person can be lowered with little risk. There are times when it is difficult to carry up such a line by hand, and rope carrying rockets are used to carry a rope right over a building.

Fire Floats.—Navigable waterways and docks where shipping must be protected from fire are usually equipped with motor steamers with high-speed powers. The engines they

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Fire Floats.—Navigable waterways and docks where shipping must be protected from fire are usually equipped with motor steamers with high-speed powers. The engines they

contain are of much the same design as those used on land. The rocket device is an important part of the equipment, as at low tide a vessel may not be approachable, and means of communication must be established.

Hose and Hose Tenders.—Hose is now usually made of a mixture of textile and rubber, a combination which is less liable to crack than the old-fashioned leather. It is made in standard lengths of 100 feet and the gear by which the lengths are fastened to each other is easily manipulated. As each engine only carries 1000 feet of hose it is sometimes necessary to have additional lengths, and for this purpose there are hose tenders which carry further supplies. The gear by which hose lengths are joined is usually very varied, as different diameters must be met by reducing or increasing joints. When water is taken from a river or pond it passes into a shoe-like sieve, which keeps out silt and mud; but as a double precaution a second sieve is fitted within the intake pipe. The nozzles of the pipes are so contrived that a jet can be turned into a spray by a movement of the wrist.

Oil and Petrol Fire Extinguishing.—Water has little effect on a blazing petrol or oil tank, and in these days, when the oil industry continues to expand, special provision is made for dealing with fires. Carbonic acid gas, being heavier than air, will float on oil or petrol and destroy combustion. This gas can be instantaneously generated by combining certain acid and alkaline substances. Motor tanks filled with the two chemicals are carried on special vehicles, the two substances are forced out of the two tanks, combining near the nozzle, and then poured upon the flames. The mixture boils and bubbles like soap suds but floats all over the surface and quickly extinguishes the flames.

Cross-country Fire Engines.—As it is often difficult to reach a fire in a country district owing to the soft and uneven ground over which the engine must travel with the possibility of its coming to a stand-still, special engines have been devised which will travel across fields, gorse land and other rough, uneven ground with the same ease as that of many military vehicles. Merryweather's 'Hatfield' engine has forward speeds and a reverse for ordinary running and is fitted with a reciprocating pump capable of delivering 400 gallons a minute at a pressure of 75 lb. to the square inch, 350 at 90 lb., and 200 at 175.

Fixed Fire Escapes.—The best kind of fire escape is undoubtedly an ex-

ternal iron staircase from the top floor of the building to the ground, connected with the windows of the intermediate floors by balconies, these are very customary in America.

Fire Alarms.—Most cities have electric fire alarms erected at intervals in the streets, whereby the fire station can be immediately warned. A small door has to be opened, or the glass covering the alarm to be smashed before the latter can be rung. Automatic fire alarms in buildings consist of arrangements whereby an electric current is closed when a certain temperature is reached by the surrounding atmosphere. These are frequently part of an automatic sprinkler installation.

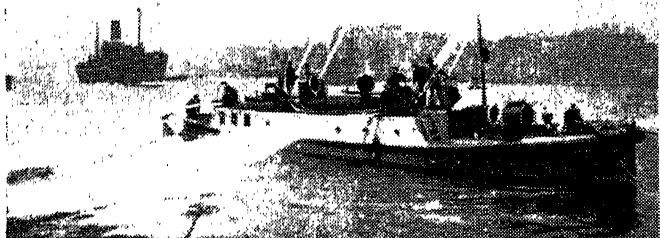
Automatic Sprinklers are useful contrivances for factories, workshops, etc. The idea is that when the air in a room reaches a certain temperature a discharge of water will take place from the ceiling. Lines of pipes containing water under pressure are carried through the building about 8 ft. apart, and sprinkler heads are attached to these at intervals. The valves which actuate these heads are under normal conditions closed by a device of which the main feature is a piece of fusible metal, which becomes softened about 160° F., and so releases the water in the pipes, which strikes against a deflecting plate and descends in a shower. If the water is liable to be frozen at times, the pipes are filled with air at a pressure of about 10 lb. to the sq. in.; the principle is precisely the same, only that the air escapes first and so operates levers which open the water valve of the main feed pipe. The idea of these sprinklers dates from the early eighteenth century, but they have been much improved of recent years.

Fire Stations.—The English fire station usually consists of a block of buildings containing the fire engines, horses, workshops, etc. In some cases the headquarters has the workshops, stores, etc., for the sub-stations, and in any case where the general headquarters is also the central station of a district, the two staffs, etc., will be quite distinct. Occasionally the headquarters is in no way a fire station, but simply an office through which all the business connected with the fire department passes. Various systems are adopted in the formation of districts and the distribution of stations. It may be taken that for the system to be satisfactory, a fully equipped party should be able to reach the fire inside the space of six minutes, including the call. The district centre should be within fifteen minutes of every call in the district. The different sub-stations and the

headquarters should all be connected with each other by telegraph or preferably telephone. The rule as to the attendance varies in different cities; some brigades send out one engine only, unless the fire is known to be serious, others send out two engines; again an engine from the district centre will be sent in some cases, but not in others. It should be borne in mind that whilst an efficient attendance is essential, there is always the risk of a second call coming whilst the first is being attended to, and the staff of the station must not be unduly depleted for a first call. The police aid the firemen in many towns, as do the turncocks and gas men, whilst in

doubtedly raises the prestige of a corps to be officered by men who have a recognised social status.

A short list of notable fires is appended—59, Lyons; 64, Rome, 10 out of 24 wards destroyed; London in 978, 982 and 1217, experienced serious fires, before the Great Fire of London, in 1666, at which over £10,000,000 worth of damage was done; 1106, Venice; 1137, York; 1405, Bern; 1728 and 1795, Copenhagen; 1524, Troyes; 1720, Rennes; 1784, Brest; 1760, Portsmouth; 1736 and 1862, St. Petersburg; 1752, and the great self-inflicted fire of 1812, at Moscow; Constantinople has suffered many



THE RIVER THAMES FIRE BRIGADE

[L.C.C.]

garrison towns the military often turn out, and the ambulance corps is generally in evidence.

As to the personnel of British F. B., the ranks may be filled by retired soldiers only, by sailors, by men formerly employed in the building trade, or a combination of all. Physical fitness is essential, and fat men are distinctly out of place as firemen. Many brigades have an age limit of forty for the men, fifty for the non-commissioned officers, and sixty for the officers. The officers of the force may be officers in the military sense, or may have had some training with the rank and file, or may have risen from the ranks. The usage varies greatly in different cities; in some the officers may rank level with the military, in others they may have no social position at all. It un-

disastrous fires, for instance, in 1729, 1782, 1784, 1848, and 1870; in 1803, Madras and Bombay both suffered from great fires; 1833, Manila; 1879 and 1872, Boston, U.S.A.; 1835 and 1845, New York; 1815 and 1845, Quebec; 1850, Cracow; 1865, Carlsbad; 1851, San Francisco; in 1857, 1859, 1866, and 1871, Chicago suffered great loss from fires, the last of which was the largest of modern times; 1866, Yokohama; 1871, Paris; 1872 and 1873, Yeddo; 1862, Valparaiso; of later years London between 1890 and 1899 had ten large conflagrations.

All the great fires, especially of later years, show very clearly that the work of *fire-prevention* is of even more importance than the actual extinguishing of conflagrations. This point, as noted above, was specially

emphasised by the Fire Prevention Congress in 1903.

Fireclays are clays which will withstand a high degree of heat, without excessive shrinkage or warping. The varieties of F. differ in their degrees of fusibility, owing to the variations in the proportion of free and combined silicon; they are essentially hydrated aluminous silicates with lime and magnesia in the form of carbonates, iron pyrites, free silica, potash, and soda, with a percentage of water. No fixed standard of refractoriness can be given, but in all good F. the fusion point is over 1600° C. Such materials as ganister, sand, sawdust, etc., are mixed up with F. before burning to ensure the 'body' of the brick being sufficiently open in character. Ordinary F. is extensively used for making bricks, crucibles, chimney-pipes, etc., but when special properties are required in the bricks, such materials as lime, bauxite, etc., are added. F. is found in conjunction with coal at Stourbridge, Glasgow, Newcastle-on-Tyne, and many other places in the British Isles. It is also found in Germany, France, Belgium, the U.S.A., etc.; the beds do not as a rule exceed 2 ft. in thickness. The Stourbridge F. is world-famous, and large quantities are exported.

Firedamp, the name applied by miners to methane (CH_4), *q.v.* It comes from the crevices in the mines, being formed in the coal, and when mixed with the air in a certain proportion is highly explosive, causing many accidents. See COAL-MINING.

Fire Engines, Escapes, etc., see FIRE BRIGADES.

Fire-extinguishing Compounds. The chemical combination of certain substances with the oxygen present in the atmosphere causes combustion; a certain temperature must be attained before combustion takes place. Combustion may therefore be arrested either by cutting off the air from the burning substances or by cooling them to a temperature below that of combustion. The former process is used when a rug, or sand, etc., is thrown over burning draperies. The latter result may be brought about by many agencies. Water is, of course, the most commonly used fire-extinguisher; the steam produced by the heat stops combustion and the water itself cools the burning substance. Fire engines, etc. (see FIRE BRIGADE), are able to apply water from a considerable distance to a fire. Various chemical liquids have been proposed, and to some extent used, as flame extinguishers. Carbon tetrachloride, CCl_4 , is very efficient on the small scale. Ejected from a metal holder, this

volatile liquid readily vapourises, and as its vapour is non-inflammable, heavy, and a non-supporter of combustion, it is capable of readily extinguishing small petrol, oil and other fires. In Germany a cardboard case containing saltpetre, sulphur, etc., which when kindled produces a vapour capable of choking a fire in an enclosed space, is used for this purpose. Portable extinguishers yielding a jet or foam of water charged with carbon dioxide (for full description see sub-heading *Chemical Fire Engines* in FIRE BRIGADES) for use by hand are often placed in the corridors of hotels, the lifts of tube stations, and if well-constructed are useful in the early stages of a fire. It is a moot point whether the mixture of gas and water generated is more efficacious than plain water, though the use of such extinguishers in early stages has frequently prevented serious conflagrations. They are especially useful in those buildings where a hydrant supply is not installed, *e.g.* garages, ordinary dwelling houses, etc. A good plan for a large building is to have a chemical engine in the basement, connected by pipes to hydrants on the various floors. By pulling a handle the gas is generated in the chemical engine and a stream issues from the required hydrant. Such liquid extinguishers are useless in the case of burning oil, which must be smothered by the application of earth, sand, or heavy fabric or of the use of carbon tetrachloride, etc.

Firefly, a name given to the luminous beetles belonging to the Lampyridæ and the Elateridæ. The former family include the true glow-worm (*q.v.*), the English species being *Lampyrus noctiluca*. Little is known as to the light given by the Lampyridæ, but most entomologists agree that it has a sexual significance; in the *Luciola*, F. of S. Europe, this brilliance is almost entirely confined to the male. To the Elateridæ belong the genus *Pyrophorus*, tropical American beetles, some of whom possess remarkable luminosity; *P. noctiluca* has a yellowish eye-like lamp on each side of the thorax, and another on the ventral surface of the abdomen. These beetles are used by the natives as lanterns and the women ornament their hair with them.

Fire Insurance, see INSURANCE.

Firelock, see FIREARMS.

Firenz, see FLORENCE.

Firenzeuola, Agnolo (1493-c. 1545), an Italian author, b. at Florence. He at first entered the legal profession after having been a student of the law at Perugia and Siena, and practised in Rome, where he was the friend of Aretino. It is said that he joined the

order of monks at Vallombrosa, and after the death of Pope Clement VII. he became Abbot of Prato. Among his works are : *Discorsi degli animali* ; *I Lucidi* ; *La Trinzia* ; and a translation of the *Golden Ass* of Apuleius. His works were first collected and published in 1548.

Fireproof Buildings and Materials. No building can sustain the unequal application of intense heat for a great length of time without suffering some damage; the term fireproof is, therefore a misnomer, and the British Fire Prevention Committee of 1903 recommended the use of the term 'fire-resisting' instead. A distinction should be made between methods of construction to minimise the damage from fire, and the preparation of materials to render them fire-resisting. The materials which naturally offer most resistance to the action of fire are brick-work, concrete, fire-brick, terra-cotta, plaster, iron, and steel. Where the two latter are used, provision should be made for their expansion. All exits to a room should be capable of being securely closed in order to confine the fire; lift-shafts or stair-wells provide a means of progress for fire. Next to good brickwork, reinforced concrete is the best fire-resisting material; the metal in the concrete is protected from the heat, and the material is very strong and less bulky than brickwork. Floors cannot be made of brickwork, and special attention should be paid to them. Various methods of combining concrete and metal have been tried; the metal or wood joists of the flooring are protected by concrete or plaster. Preparations which are designed to render materials fire-resisting are applied not only to wood, but to textile fabrics. Such preparations should not weaken or corrode, and should have a lasting effect. Aluminium hydroxide and aluminium sulphate leave an earthy deposit, on being heated, to cover the material; ammonium borate and ammonium phosphate coat the material with a glassy protective covering of boric or phosphoric acid respectively. Asbestos paint is also used to coat wood, but is liable to peel off with lapse of time; in the case of wood in buildings, the fire-resisting materials should be applied periodically, as the effect of them all gradually wears off. The committee of 1903 (*see supra*) considered that for popular use all such materials should be classified under three headings: (1) Those which afforded *temporary* resistance to fire, that is for at least three-quarters of an hour; (2) those affording *partial* protection, resisting a fierce fire for more than

one and a half hours; (3) those giving *full* protection, that is for two and a half hours and more.

Fire-raising, the term used in Scots law for what is known in English law as arson. It applies to the setting fire wilfully to someone else's property, such as burning ships, buildings, growing wood, or corn, coal, or articles of that sort. The law with regard to this also forbids setting fire to one's own or other people's property with the intention of defrauding the Insurance Company, and these offences are punished in Scotland with penal servitude.

Fire-ships, vessels filled with combustible materials for the purpose of bringing destruction on the enemy. The 'fire-chamber' was built between the decks from bulkhead to forecastle and filled with various combustible materials, among them gunpowder. These were then set fire to and sent among the enemy, the men escaping in boats. They were employed to defend Antwerp in the siege of 1585, and in 1588 to destroy some of the ships of the Armada. In more modern times Lord Dundonald used them against the French in 1809, but after that they were very little used. Certain kinds of floating fire were, however, used much earlier than any of these, some being mentioned by Livy as being used in the second century B.C.

Fire Tactics have undergone considerable modifications since the first introduction of firearms in warfare; the increased range and efficiency of the arms of infantry and artillery have naturally made many changes. The method of delivering fire which was originally used by the Spaniards for infantry was for each man in succession to fire, and then to fall to the rear of the line to reload. This required a great degree of coolness and individual skill to be successfully carried out. As the handiness of the musket was improved fire firing became more and more irregular, and by the middle of the seventeenth century it was the usual custom for the musketeers to fire one or two 'voleros,' or 'salvees' and then charge. Until the Prussian era musketry methods were still half-hearted, and the lack of effectiveness of the infantry may be put down to the fact that 'fire' and 'movement' were distinct, as their fire was reserved until as near the enemy as possible. The 'linear' system consisted of two long lines of battalions, giving the utmost scope for fire, as it was considered that the maximum weight of controlled fire at short range was a decisive factor. The Prussian system of fire discipline was

originated by Leopold of Dessau and Frederick William I., and put into operation by Frederick the Great. Under this system a battalion consisted of eight companies, which fired 'company volleys' as follows. As the company on the extreme right commenced to fire, the second company was at the 'ready,' and so on; the same process was gone through on the left flank, so that by the time the centre companies had fired the end companies were again ready. Since that time rifles have become efficacious at over 1000 yds., and the finding of the range has become a matter of importance. The fire of an infantry company is controlled by the non-commissioned officers and officers, who name the target and give the range. Firing by volleys is the usual method; save at short ranges independent fire and magazine fire are rarely adopted. The most important modification of rifle fire has been the adoption of rapid fire in 'bursts' as the normal method for infantry instead of slow continuous fire. Three rounds per minute is the rate for slow fire, and from eight to twelve rounds for rapid aimed fire. Machine-gun tactics are still somewhat indefinite, but one or two principles of action stand out clearly. It is important that whether they are used in numbers, or as auxiliaries, they should be free to move without being under the necessity of maintaining a relative position to some other unit. Machine-guns must also co-operate with other troops as closely as possible, and must be able to be concealed, and evade the enemy's shrapnel. As the result of experience in the Great War, machine gun companies are now attached to regular infantry battalions. The most favourable range for machine-gun fire is from 600 to 1400 yds. The same principle of firing in 'bursts' is observed. As regards guns which come in the category of artillery, four methods of firing are used. When each gun is fired separately at a signal from the commander of the battery, this 'independent' fire is used to find the range, etc. When guns fire at stated intervals all along the line of the battery; this is known as 'battery fire.' If the guns of each section are fired at the will of the commander thereof with no reference to the rest of the battery, this is known as 'section fire.' Firing by salvos is when all the guns fire simultaneously; this is only employed very rarely, as sometimes for salutes, etc.

Fireworks, see PYROTECHNICS.

Firmament, a name applied to the vault of Heaven, the Vulgate translation firmamentum being the render-

ing of the Septuagint στερέωμα, the idea in Hebrew being that of something stretched out. The F. was originally looked upon as a solid sphere, which revolved and carried with it the stars which were fixed to it—also forming the division between the 'waters above the firmament' and those below it. This led later on to the Ptolemaic system of astronomy in which there were supposed to be a number of spheres revolving one outside another.

Firmân, or Firmaun, the term applied to a decree issued by the sultan. Any minister can sign such a decree, but a special one has to make it effective by placing on it the name of the sultan in a monogram. The term also signifies a passport which is granted by the sultan or a pasha.

Firozpur, or Ferozepore, a dist. and tn. of the Punjab, India. The former has an area of 4302 sq. m., and its surface is level and fertile, wheat, barley, millet, cotton, tobacco, and oil-seeds being produced. The town of F. is the civil headquarters, and a military cantonment. It is situated about 3 m. from the l. b. of the lt. Sutlej, and contains an arsenal. Pop. of dist. 965,000, and tn. 54,351.

Firozshah, a dist. of the Punjab, British India, situated near Firozpur. The village of F. was the scene of a battle which took place in 1845, when the British under Sir Hugh Gough and Sir Henry Hardinge defeated the Sikhs.

First Aid, see ANTIDOTES, BANDAGES, BLEEDING, BRUISES, BURNS AND SCALDS, CHOKING, CONCUSSION OF THE BRAIN, CONVULSIONS, DISLOCATION, DROWNING, EPILEPSY, FAINTING, FIT, FRACTURE, Hysteria, POISON, SPRAIN, SUNSTROKE.

First-Fruits, the first profits of any office, property, etc., as e.g. in feudal tenure, the year's profit of the land after the death of the tenant, which was payable to the king; and in ecclesiastical law, the first year's income of a benefice. When the Papal power was dominant, each new incumbent had to remit to the papal treasury the first year's revenues (*primities*) of his benefice. Valuations of annates were made in England in the thirteenth century and probably originated about that time. At the Reformation the F.-F. enacted by Henry VIII. in England were the annates of the bishoprics which he had secured from the Papacy. Their valuation was recorded in the *Liber Regis* in 1535 and became the basis of the valuation of the English clergy thereafter. In Queen Anne's reign, these annates were given up to a fund for augmenting poor livings.

First of June, Battle of the. The name given to the naval victory of Lord Howe over the Fr. which was fought off Ushant and terminated on June 1, 1794. This was the first occasion on which the Fr. naval strength in the Channel had been encountered in the Napoleonic Wars, and the victory was important in its results both in destroying Fr. naval activity in the Channel and in depriving them of a large quantity of grain which was under convoy from America. The number of ships on either side was about equal, and the fight was hotly contested; but though it is always referred to as the 'glorious' First of June, no remarkable evidence of naval skill was given. The result, however, was decisive, for the French admiral lost seven ships, and 3000 men, and was compelled to seek refuge in Brest.

First Offenders Act, 1887. This Act was passed to permit the conditional release of first offenders in certain cases. It gave power to any court before whom a person was convicted of larceny or false pretences or any offence punishable with not more than two years' imprisonment to release the prisoner upon probation of good conduct instead of sentencing him to imprisonment, provided it were shown that there was no previous conviction against him. Not every first offender was entitled to such consideration; the Act expressly limiting its operation to cases where the youth, character, and antecedents of the offender or the trivial nature of the offence, or other extenuating circumstances, justified the release on probation. This Act is now repealed by the Probation of Offenders Act, 1907, because it was thought that the earlier Act gave to a court of record no powers beyond what it already possessed at common law. The Act of 1907 extends to the case of any person convicted on indictment, and adds to the extenuating circumstance those of health and mental condition. Where it releases the offender it is only on condition that he enter into a recognisance, with or without sureties, to come up for sentence if called upon within three years and to be of good behaviour. The court may also order him to pay the costs of the proceedings and compensation for any loss sustained. A parent or guardian of an offender under sixteen may also be ordered to pay such compensation and costs. A court of summary jurisdiction has analogous powers under the Act.

Firth (Icelandic *fiord*, English *frith*), a Scottish name applied to a narrow arm of the sea, e.g. Firth

Bay, a shallow inlet 6 m. from Kirkwall, etc. It is frequently a river estuary, as the Firth of Forth and the Firth of Clyde.

Firth, Sir Charles Harding (b. 1857), English historian, b. at Sheffield. F. was lecturer at Pembroke College, 1887-93; Ford's lecturer in English history in the University of Oxford, 1900; fellow of All Souls' (1901), of the British Academy (1903), of Oriel (1904). In 1904 he was appointed regius professor of modern history at Oxford. His works include: *Scotland and the Commonwealth*, 1895; *Journal of Joachim Hane*, 1896; *Scotland and the Protectorate*, 1899; *Oliver Cromwell . . .*, 1900; *Cromwell's Army . . .*, 1901; *Naval Songs and Ballads*, 1907; *The House of Lords during the Civil War*, 1910; editions of Lives of Colonel Hutchinson, 1885, and the Duke of Newcastle, 1886; Ludlow's *Memoirs*, 1894; *The Clarke Papers*, 1891-1901. He has also contributed to the *Dic. of Nat. Biog.*

Firth, Mark (1819-80), a philanthropist and steel manufacturer, was a native of Sheffield. In 1843 he established in Sheffield his own steel-works, which grew rapidly in size and importance, and where eventually most of the steel ordnance came to be manufactured. As a philanthropist he figures as the donor of a park (opened in 1875), Firth College (founded in 1879), and almshouses, all of which gifts were bestowed on Sheffield.

Fiscal, see PROCURATOR FISCAL.

Fiscal Reform, see TARIFF REFORM.

Fischart, Johann (c. 1545-c. 1691), a famous German satirist, a native either of Strasburg or Mainz, and seems to have been a student at Worms. He took the degree of doctor of the University of Basle about 1572, and after travelling in France and England went to Strasburg about 1576, and in 1581 became advocate to the imperial court at Spire. After his marriage he became magistrate or bailiff at Forbach, near Saarbrücken (1583). His works, the greater number of which were written between 1575 and 1581, are many of them clever satires directed against the pope, the Jesuits, the aristocracy, and all sorts of folly. They are mainly based on the model of Rabelais, but at the same time are characterised by a true originality. In addition to these satires there are many works which are purely humorous, and which assure to him one of the highest places among German humorists. He was also a master of his own language, which fact is exemplified very clearly in his translation of the *Gargantua* of

Rabelais. He has also written a number of other works, though the authenticity of some of the works attributed to him has not been proved. Among his satires are: *Aller Praktik Grossmutter*, 1572; *Affentuerliche Geschichtschrift von . . . Gargantua und Pantagruel*, 1575; *Podagrammisch Trostbüchlein*, 1577; and *Bienenkorb des heiligen römischen Imenschwarms*, 1579; while *Flöhhatz*, 1573, and *Weibertratz*, 1573, are among his humorous work. He has also written *Das glückhafte Schiff von Zürich*, 1576. See Life by C. H. W. Wacknerhagl, 1870.

Fischer, Emil (1852-1919), distinguished Ger. organic chemist; b. at Euskirchen. Studied at Bonn and Strasburg and, after some years as assistant to von Bayer in Munich, became professor of chemistry, first at Erlangen and then at Würzburg. Later he succeeded von Hoffmann as professor of chemistry at Berlin, and during his tenure the school flourished so that students came to it from all parts of the world. He became famous for the preparation in conjunction with Julius Tüfel of synthetic sugars and from those of the ferments and enzymes. His work on proteins was, however, his principal achievement. His other researches included the analysis of the constitution of the rosaniline dyestuffs; investigation of uric acid; and the preparation of purin and its derivatives. The value of his work in organic chemistry was recognised in most countries: in 1890 he was awarded the Davy Medal of the Royal Society; and in 1902 the Nobel prize for chemistry.

Fischer, Ernest Kuno Berthold (1824-1907), a German philosopher, b. at Sandewalde, Silesia, and was a student at Leipzig and Halle universities. He became a lecturer at Heidelberg, and in 1856 professor of philosophy at Jena until 1872, when he succeeded Zeller at Heidelberg. His chief work is *Geschichte der neuen Philosophie*, begun in 1852 (new ed. 1897-1904). He also wrote: *Logik und Metaphysik oder Wissenschaftslehre*, 1852; *Franz Bacon und seine Nachfolger* (later ed.), 1875; *Benedikt Spinozas Leben und Charakter*, 1865; *Anti-Trendelenburg*, 1870; *Goethes Schriften*, 1888-1904.

Fischer, Karl von (1782-1820), an architect, a native of Mannheim; studied architecture in Vienna, as well as in other countries of Europe. He eventually became professor of architecture at Munich Academy. His chief work was the Hof Theatre at Munich, where he also built other places of less importance.

Fiscus, or Fisc (Lat. *fiscus*, a basket

or treasure-chest), was in the time of the Romans the name applied to the emperor's treasury to distinguish it from the *ararium*, or state treasury, and later on designated the public money which he had by virtue of his office. This is the modern sense of the word, the word *ararium* having been discontinued for a long period.

Fish (Old Eng. *fisc*, Dutch *visch*, Lat. *piscis*), a class of vertebrates which live under water, breathe through gills, and whose limbs are modified into fins. There are four orders: The *Elasmobranchs*, the *Ganooids*, the *Dipnoi*, and the *Teleostei*. The *Elasmobranchs*, or cartilaginous Fs., were very numerous in prehistoric times, but are now only represented by such F. as skates, rays, sharks, and dog-fish. The *Ganooids*, or armoured fish, are nearly extinct. The members of this order are the sturgeon and bony pike, the *polypterus* and the *amia*. The *Dipnoi*, or double-breathers, consist of three groups: the *prolatopus*, the *lepidosiren*, and the *ceratodus* found in W. Africa, the Amazon R., and Queensland respectively. The *Teleostei*, the newest of the three orders, include nearly all modern Fs. They possess a bony vertebral column, a brain and dorsal nerve cord, branchial clefts communicating with gills; they are covered with scales and have two paired fins without fin-rays, and unpaired fins and a tail, with fin-rays. The *Elasmobranchs* have few eggs and are often viviparous, but the majority of other Fs. have very numerous eggs. The sight of fishes is keen, but owing to the nature of the element in which they move, the range of vision is probably very limited. Although their hearing apparatus does not appear to be as complete as that of animals of a higher grade, they possess this sense to a remarkable degree. The sense of smell is also acute and the olfactory nerves are usually of large size. Although some fishes appear to feed upon vegetable substances, by far the largest number are carnivorous, the preying of one species upon another being nature's method of preserving the balance between them. It appears to be almost necessary that this should be so, as for example, a single ood can lay as many as four or five million eggs. The eggs of the fish form the roe: two elongated oval lobes, one on each side of the body, placed between the ribs and the intestinal canal. Apparently when the female has deposited her eggs she takes little further interest in them and it is the male who does any tending or guarding that must be done. Of

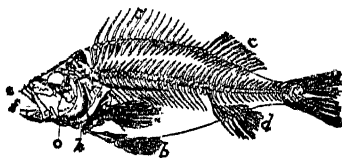
recent years much interest has been taken in the fishes that inhabit the very deep seas, and some interesting light has been thrown upon them. The long-doubted kraken or octopus of huge dimensions has apparently now taken a settled place in the world of natural history. It is contended that he is but one of many of the denizens of the ocean able to live at great depths of which we have little knowledge. Below a certain depth the fishes appear in many cases to have the power of creating their own light, being equipped with luminous organs. The purpose of this self-made lamp is not clearly known, and whether it constitutes a sex call, or is a warning to enemies, or a lure for prey is still a subject of surmise. The colouring of fishes is of remarkable variety, and, in some cases, of great beauty. Generally speaking it seems to be of a protective nature assisting the fish to camouflage themselves (like 'mimetic' insects), wherever they may be, by close resemblance

fishes that have picked them up en route. The F. was a symbol of Christ in early Christianity. The reason for the use of this symbol was that the first letters for the titles of Christ in Greek (Ἰησοῦς Χριστός Θεοῦ Υἱός Σώτης, i.e. Jesus Christ, Son of God, Saviour) make up the word ἰχθύς, (fish). See articles on FISHERIES, PISCICULTURE.

Fish Curing, a term used to describe methods of preserving fish intended for distant markets or for consumption at a later period. This is usually done by salting, drying or smoking. Of recent years the improved facilities of carriage and the use of refrigeration have made it unnecessary for fish to be cured for marketing in many cases where it was once essential; but against this, the enterprise of merchants in various parts of the world has built up a demand in remote areas where previously little trade was done. The two chief varieties of fish thus treated are herrings and cod. The latter of these are usually dried, either split or treated whole. The fish curers of Iceland are especially well known for their skill in preserving cod, which enables it to be sent to very remote areas. Herring-curing is usually done by salting, the pickle being little more than the natural salt of the sea brine. A large demand exists for smoked herrings, and great care is taken in selecting the right kind of wood to be used for this purpose, as the flavour is very easily affected by the nature of the smoking. Around the British sea board many endeavours have been made to deal with the problems arising from the occasional unexpected glut of herrings, and, where suitable warehouse accommodation exists, and a local population prepared to join in 'rush jobs' is available, as in some places on the Northumberland coast, large quantities of herrings are frequently cured with remarkable speed.

Fish, Hamilton (1808-93), an American statesman, a native of New York, and a graduate of Columbia College. He was called to the Bar in 1830, and twelve years later became a member of Congress on the Whig side. In addition to this, he became governor of New York in 1848, a member of the Senate in 1851, and Secretary of State from 1869 to 1877, under Grant. He was chosen on a commission to visit prisoners during the Civil War, and during the time of his secretaryship was in negotiation for the Washington treaty of 1871, which he signed.

Fish, Royal. In English law, cer-



SKELETON OF THE COMMON PERCH

a, the pectoral fin; *b*, the ventral fin; *cc*, the dorsal fins; *d*, the anal fin; *e*, the inter-maxillary bone; *f*, the maxillary bone; *g*, the operculum; *h*, the sub-operculum; *i*, the pre-operculum; *k*, the inter-operculum.

to their surroundings. Thus along the muddy floors of the sea the flat fish shows the brown upper surface that is indistinguishable from the ground on which it rests, fishes dwelling in the duller waters are brown and dull leaden in hue, while those that float upon the currents or near the surface, have the green and blue markings suggestive of the waves. Very beautiful and rich colours are found in those that move near to the bright vegetation, and strangely enough in some that dwell in the very deep seas, although in the latter cases they resemble autumn hues rather than the gay tints of summer. Many kinds of fishes are gregarious and keep together in shoals and schools. A curious variation of this fondness for company lies in the fact that sailing ships at sea are sometimes followed for amazing distances by

Fisher

tain fish (whales, sturgeons, porpoises, etc.), when taken in territorial waters, belong to the crown or its grantee, though caught by another person.

Fisher, Andrew (1862-1928), Australian statesman; *b.* Aug. 29, in Kilmarnock; son of Robt. F. Worked in a coal-mine and went to Queensland in 1885. Elected to Queensland legislature in 1893; Minister of Railways in Dawson administration. In 1901 entered Commonwealth parliament as Labour member for Wide Bay. Joined Watson Labour Cabinet, 1904, as Minister of Trade and Customs. Leader of party from 1907. In 1908 Prime Minister for six months. In 1910 back in power. P.C. 1911. Gov. fell, 1913; but he returned to power Aug. 1914. Resigned 1915 and became High Commissioner in London; where retiring 1921, he *d.* Oct. 22.

Fisher, Rt. Hon. Herbert Albert Laurens, British scholar, parliamentarian, and author; *b.* March 21, 1865, in London; eldest son of H. W. Fisher. Educated at Winchester; New College, Oxford; Paris; and Göttingen. First class in classical moderations and in Lit. Hum. M.P. (Lib.), Hallam div. of Sheffield, 1916-18; (Nat. Lib.) Eng. Universities, 1918-26. President, Board of Education, 1916-22. Fellow of British Academy, 1907; President since 1928. Fellow of Winchester College, Trustee of Brit. Museum. Delivered S. African lectures, 1908; Lowell lectures, Boston, Mass., 1909 and 1924; Chichele lecturer in modern history, Oxford, 1911-12. Warden of New College since 1925. Member of royal commission on public services of India, 1912-15; of gov. committee on alleged German outrages, 1915; Vice-chancellor of Sheffield Univ., 1912-16; Brit. delegate to League of Nations Assembly, 1920-22. Publications include: *The Medieval Empire*, 1898; *Studies in Napoleonic Statesmanship*, 1903; *Bonapartism*, 1908; *Life of F. W. Mailland*, 1910; *The Republican Tradition in Europe*, 1911; *Political Unions*, 1911; *Napoleon Bonaparte*, 1913; *Studies in History and Politics*, 1920; *An International Experiment*, 1921; *The Common Weal*, 1924; *Life of Lord Bryce*, 1926; *Life of Sir Paul Vinogradoff*, 1927; *Whig Historians*, 1928; Contributions to the *Cambridge Modern History*.

Fisher, John (c. 1459-1535), a Bishop of Rochester, a native of Beverley, Yorkshire, and was educated at Cambridge, becoming master of Michaelhouse College in 1497. He was appointed by the Countess of

Richmond, mother of Henry VII., as her confessor, and in 1504 became chancellor of Cambridge University and Bishop of Rochester. He was a staunch supporter of the new learning and also of the authority of the church, which made him a vigorous opponent of Henry VIII.'s divorce from Katherine of Aragon. For this reason, and on account of the pope making him a cardinal, he was accused of treason and beheaded by the king's orders.

Fisher of Kilverstone, Sir John Arbuthnot Fisher, 1st. Baron (1841-1920), British admiral; *b.* Jan. 25, on the Wavenden estate, Ceylon; son of Capt. Wm. Fisher, 78th Highlanders. Entered the navy in 1854, and served in the Crimean War of 1855, and the China War of 1859-60; took part in capture of Canton and Peino forts. In 1882, as commander of the *Inflectible*, he was present at the bombardment of Alexandria. Director of naval ordnance, 1886-91; rear-admiral, 1890, admiral superintendent of the dockyard, Portsmouth, 1891; controller of the navy and Third Sea Lord of the Admiralty, 1892-97; K.C.B., 1894; vice-admiral, 1896, commander-in-chief of the N. American and W. Indies station, 1897-99; Delegate to Peace Conference at The Hague, 1899; commander-in-chief, Mediterranean station, 1899-1902. Admiral, 1901; Second Sea Lord, 1902-3; commander-in-chief, Portsmouth, 1903-4, and First Sea Lord of Admiralty, 1904-10. Admiral-of-the-Fleet, 1905. Renobbed Dec. 7, 1909. During his term as First Sea Lord, he introduced many reforms, including that of the nucleus crew, which rendered a peace-time navy rapidly available for war; the elimination of obsolete ships; and the substitution of the Dreadnought type. He will go down in history as the man who, in 1910, predicted the date of the war with Germany and shaped his policy accordingly. Under many govts. he laboured and planned with extraordinary success to provide an adequate fleet, and when the Great War broke out, the Grand Fleet was in readiness to sail to the right location and thwart the enemy, which it did by going, at the psychological moment and without delay, to its different war stations in the mouth of the Elbe and at the entrance of the Channel. The authority for the statement that F. predicted the date of the war is Sir Maurice Hankey, who states that it was at Kilverstone that F. foretold the approximate date, and said that Jellicoe would command the fleet when the war

came. Regardless of the predictions of others, he made promotions with this end in view. He retired from the Admiralty, Jan. 1910, after a long quarrel with Admiral Lord Charles Beresford, who had been in charge of the Channel Fleet, and who brought charges of parsimony against the Admiralty, which a committee of the Cabinet found to be unsustainable. F. also retired from the Navy in 1911. In 1912 he was president of the Royal Commission on Oil Fuel and Engines, and it was through the researches of this body that in 1913 the Admiralty launched the first oil-fired battleships of the *Queen Elizabeth* class and that the first light British cruisers (*Arethusa* class) to burn oil fuel were on the point of being commissioned when the war commenced. The *Arethusa* class certainly proved its value in the war, notably in the action off the Bight of Heligoland. F., however, wanted to go further, and instal the internal combustion engine in ships which should offer a mark of some 33 per cent. less area than any 5000-ton vessel theretofore built and be able to circumnavigate the globe without refuelling. But sound as the idea was, the time was not ripe for so great a change in construction. When the war commenced F. had been in retirement since the age of seventy, though after that age he continued to exercise a very real influence on naval policy, and in particular his advice was sought by the gov. and followed in the handling of the Agadir incident (*q.v.*). When, through prejudice and popular clamour, the Marquis of Milford Haven (*q.v.*) was driven to resign office, F. succeeded him as First Lord, and at once commissioned some 600 vessels of all classes, and in many cases of new design, to be completed by the early part of 1915. His ambitious plans, however, for the use of these ships were frustrated by the Dardanelles expedition, which was diametrically opposed to his naval policy of striking at the heart of Germany by a landing force, covered by the navy, on the coast of Pomerania. When he saw that ships were being gradually withdrawn from the North Sea forces to supply the needs of the Mediterranean forces, so that (in his opinion) British control of the sea was in jeopardy, he tendered his resignation, and retired immediately after the Coalition gov. came into office. But this did not mark the actual end of his services, although no adequate sphere for his great energies and amazing prevision was thereafter

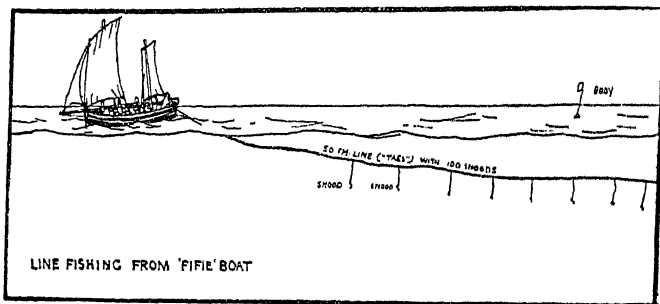
open to him in naval affairs. But his work in organising the Board of Invention and Research, a purely advisory body, which work he rendered on recall in 1915, was highly effective. He appears to have spoken in the House of Lords on two occasions only, and then only on matters arising out of the Dardanelles expedition. Laconic in the extreme, the first speech, following the resignation of Mr. Churchill from the Cabinet in Nov. 1915, was by way of retort to Mr. Churchill's accusation that the First Sea Lord had not given clear guidance or firm support over the Dardanelles question. Possibly the accusation was justified, for F.'s heart was never in the expedition, but in his reply he said that, having rendered sixty-one years of service, he was content 'to leave his record in the hands of his countrymen,' and that it was not in the national interest to make aspersions when the country was in the midst of a great war. The second speech was in March 1917, and was to much the same effect. Although thus laconic in debate, he was, especially as he grew old, garrulous and flowery in discussion and correspondence. Whatever his faults of impulsiveness and sailor-like bluntness—as exemplified by his famous phrase 'Sack the lot'—he was essentially the great organiser and administrator who created the modern British Fleet and whose uncanny strategic provision secured its efficiency and readiness for war. In July 1918 his wife, a daughter of the Rev. T. D. Broughton, with whom he had enjoyed domestic happiness for fifty-two years, died. Thenceforth he resided almost entirely with the Duke of Hamilton's family. In 1919 he published two very characteristic books—*Records*, and *Memories*. From these the reader gets the impression that Cutcliffe Hyne's *Captain Kettle* was drawn, in part at least, from F. He died, after undergoing three operations, at 10 St. James's Square, London, July 10, and was buried in Westminster Abbey.

Fisheries, Board of, see FISHERIES.

Fisheries, River and Lake, are regarded in England as centres of sport and recreation. They are generally the right of the owner of the soil over which the water flows, and in the hands of private owners. It is divided into several and common fishery. A several fishery is the exclusive property of the owner of the soil and can only be transferred by deed; should the right be unclaimed the public acquire no title by right of custom. If the course of a river

is diverted, the late owner has no claim to the new channel, though with the encroachment of the river he simultaneously becomes entitled to the rights of fishery. The owner has the right to all the fish he can take, and is not restricted in the use of machinery if that machinery does not disturb the navigation. He cannot put up an obstruction to fish above or below the part under his control, neither may he use dynamite nor any other explosive, nor pollute the river in any way. Common fishery is fishery which all persons may enjoy. The crown has no right of fishery in non-tidal waters on a subject's property. The control of fresh-water fisheries is in the hands of district boards appointed by county councils which regulate the bye-law and licences and fix the

cluding the whale. Dried and salted fish was an important article of commerce among ancient peoples, and many great maritime cities, both ancient and modern, had their origin in fishing villages. A herring fishery is known to have been established off the English coast by the eighth century, and a little later the British fishing industry had extended all over the North Sea up to the Arctic regions. The industry was greatly assisted by the growth of Christianity, since the demand for fish for fasts, enjoined by the church, was considerable. In this country the Reformation dealt a severe blow to the fisheries, and the British supremacy in this direction was not regained till after the Napoleonic Wars, having been held in the meantime by the Dutch. During the latter part of the nineteenth



close time for the protection of fishing. There are special laws for salmon and fresh-water fishing. The principal fresh-water fish are carp, barbel, tench, roach, bream, trout, salmon, and chub, but they are not considered of nearly so fine a flavour as sea fishes. The most important lake fishery in the world is the Great Lakes fishery in the United States, from which great quantities of food fish are obtained, including whitefish, trout, pike, and perch. Huge quantities of fish are obtained from the Mississippi R. The rivers of Russia are well stocked with food fish, and carp, bream, lampreys, and sturgeon are extensively caught in the Ural and Volga rivers.

Fisheries, Sea. The capture of fish as a food for man seems to have been carried on from very early times. Cave remains in Western Europe afford evidence of the use of many different kinds of implements for fishing and of the capture of a considerable variety of species, even in-

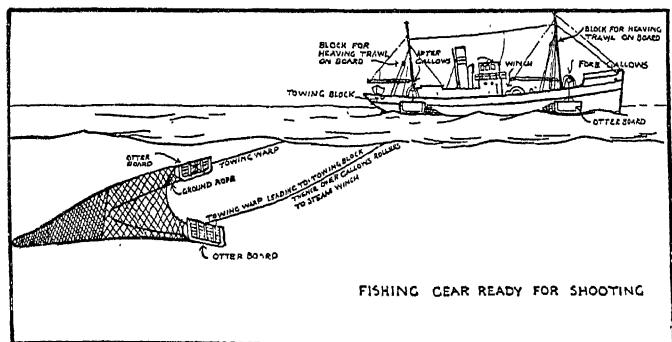
century, the fishing industry throughout the civilised world received a great impetus from the introduction of steam. This first showed itself in the increased market for fish rendered possible by railway transit, and later spread to the methods of fishing themselves. Steam drifters and trawlers are now largely used, and by these means, and the introduction of ice as a preservative, fresh fish is sold at great distances inland. The regulation of the fishing industry has also been found necessary, as many of the best grounds were becoming worked out owing to indiscriminate methods. A scientific study of the protection and cultivation of various breeds of fish is hoped to do much towards restocking exhausted districts and keeping up the supply in others.

Methods of fishing.—The numerous modes in which fish are captured all fall under three main heads: fishing by lines, nets, or traps. Fishing with a hooked line is of three varieties, known as the hand-line, the small

line, and the long line. Fishing by hand-line is largely carried on off the E. and S. coasts of England for cod and whiting. It is only possible in shallow water near land, and the lines are single and bear one or more hooks. As each fish is caught, the line is drawn up and the hooks re-baited.

Small-line fishing is the principal method employed in the Scottish haddock industry. It is carried on by small boats, known as yawls, within 2 or 3 m. of land. The lines range about 2000 fathoms, and are usually baited on land by the wives and children of the fishermen. Mussels form the usual bait, but limpets, scallops, cockles, lugworms, and crabs are also used. The hooks are attached to 'snoods' about 4 ft. apart, and the line, when ready, is coiled into a creel, the baited hooks all lying in the

for the capture of large fish, such as cod, ling, coalfish, halibut, skate, rays, turbot, conger, and hake. Off the Scottish coast this mode of fishing is generally carried on by the herring boats, and herrings are used as bait. Off the English coast large vessels with a sea-water well are used, in which the fish are kept alive. The English long line is often about 8 m. long when shot, and carries over 4000 hooks; squid, whelks, herrings, and lampreys are used as bait. Steam vessels are now employed in long-line fishing, and are usually provided with an ice-chamber for storage. The Scottish North Sea long-line fishing is carried on mainly from March to July, and extends as far N. as Iceland. It requires deep water of over 200 fathoms. It is also worked during the winter over the Dogger Bank and



centre, and fresh grass scattered over them to keep the bait fresh. When the fishing ground is reached, the lines, all fastened together, end to end, are run out over a metal cylinder. The ends are kept down by large stones, to which are also attached lines reaching to the surface, and there fastened to a buoyed flagstaff, weighted so as to float upright and mark the position. The line is shot across the tide, and is left at the bottom for from half an hour to an hour. Plaice, codlings, whittings, dabs, flounders, and gurnets are also caught by this method, though haddocks form the chief haul.

Long or great line fishing, also known as 'bulter' or 'trot' fishing, follows the same principle as small line fishing, but employs longer and stronger lines, and larger hooks. It is largely used in the North Sea, by both English and Scottish fishermen, at a considerable distance from land

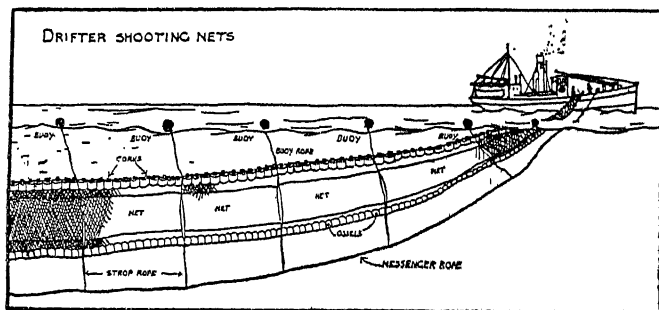
Cromer Knoll. The 'bulter' is the term usually applied to the long line used off the S. coast of England, which is not so long as the North Sea type, and is worked from smaller open boats.

Fishing by line has several advantages over the use of nets. The fish secured by a line are less bruised and injured, and thus preserve their freshness better. Also, long lines can be shot over rough rocky ground and in mid-water, where trawling, etc., is impossible. Many species of fish may be secured by either method, but some, such as congers, seem to be only caught by lines, and others, such as soles, only by nets.

Fishing by nets is of many different varieties. Of these the most important is trawling, by which most of the fish for the British market is secured. Trawling is an industry which has been altogether developed during the last century. First used in the S.W. of England, it was introduced to

Ramsgate in 1815, Harwich in 1828, Hull in 1844, and Grimsby in 1858. Steam trawlers made their appearance in 1879, and have recently largely increased in number, being faster and more sea-worthy, and having a much larger fishing capacity than the sailing vessels. Trawlers work for the most part in about 40 ft. of water, though the operation is possible, at a greater labour, in 70 ft., and a smooth and level bottom is essential. The sailing vessels register from 30 to 100 tons, being larger off the E. coast than the S.W., and are either cutter or ketch-rigged, the latter rig being the safer and more economical. The steam-trawlers are about 130 ft. long. The North Sea, off the E. coast of England, is the great trawling ground, and large numbers of boats are owned by Hull,

quarters, fish between the Irish coast and the Isle of Man. Trawls are of two kinds, the 'beam' and the 'otter,' the latter being the newer and better. The beam-trawl is a large conical bag-shaped net, with a wide mouth kept open by a beam of wood, which has iron runners at its ends. The lower edge of the net is weighted, and the whole apparatus is dragged by the boat over the sea bottom, thus enclosing the low-swimming fishes in a kind of bag formed by the hind end of the net. The net is often 80 ft. long and the beam measures from 18 to 50 ft. The net is kept extended by a stout foot-rope, and a ground rope stirs up the fishes. The net is brought on board by means of a warp of strong steel wire attached to the bridle-ropes, and the haul is emptied at the 'cod'



Grimsby, Yarmouth, Lowestoft, and Ramsgate. In winter they work on the Dogger Bank, and each vessel stores its own fish in ice and carries it in; while in summer the fleets work farther afield, off the coasts of Denmark, Holland, and Germany, and deliver up their hauls to a steam-carrier. The S.W. coast trawlers work independently from Brixham and Plymouth, and fish near those ports in winter and S. of Wolf Rock, or off the N. coast of Cornwall in summer. Some trawling is done by steam-tugs from Falmouth and Cardiff. Another trawling ground lies off the N.W. coast of England, and is worked by boats from Tenby, Whitehaven, Fleetwood, Blackpool, Southport and Liverpool. The Scottish trawlers are almost all steam boats, and work outside the Firth of Forth, off the coast of Aberdeenshire, and in the Moray Firth, the vessels coming from Granton, Leith, and Aberdeen. A large fleet of Irish trawlers, with Dublin as their head-

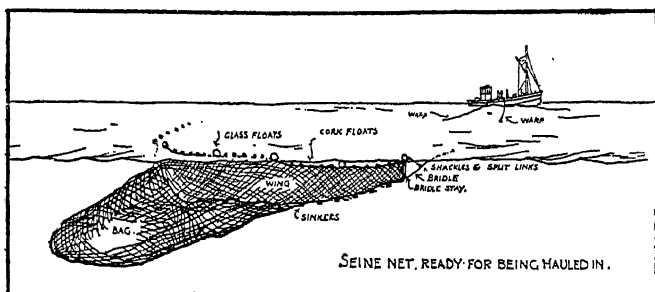
end, i.e. that furthest from the beam. In the case of the otter-trawl, the single heavy beam is replaced by two boards which automatically come apart when the trawl is let down and come together when it is hauled in, thus rendering the latter operation much easier. The boards are often weighted with iron plates, and only one edge rests on the ground, while a direct pull on the trawl is obtained by the use of from 6 to 12 ft. of chain between them and the bridle. A simpler form of the otter trawl is used by Italian and Spanish fishermen. The labour involved in trawling is very considerable, since the hauling of a heavy trawl on board takes at least an hour, and the expense caused by damage done to the nets by obstacles on the sea-floor is often heavy. Almost every kind of fish is caught in greater or smaller numbers by the trawl, though ground-feeding species predominate. Flat fish always form a large proportion of the haul, which includes sole, plaice, rays, conger,

red mullet, dory, mackerel, bass, turbot, brill, halibut, cod, haddock, hake, gurnard, conger, and ling. The trawl has received much hostile criticism from those anxiously regarding the depletion of our waters, since, catching as it does everything that comes in its way, it destroys many immature fish and much spawn.

The drift net forms one of the most scientific methods of fishing, depending as it does on knowledge of the habits of certain kinds of fish and observation of their whereabouts at certain times. The net is set up in the water, being kept in a vertical position by weighting the lower end and buoying the upper with cork, wood, or glass floats, and is allowed to drift with the tide or current in such a way that it is at right angles to the direction which is being taken by a school

mackerel, to windward of itself, and boat and net drift together, the former being kept head to wind by a small mizzen sail. A large number of boats can fish on the same ground, drifting parallel, without the nets becoming entangled. When the nets are hauled in, the fish are torn from the meshes and thrown on deck. Trawling and drift-net fishing have been seriously hampered on some parts of the British coast, notably the coast of Devon and Cornwall, by sunken wreckage, resulting from the submarine destruction of shipping during the Great War. Great damage is suffered by the nets, which are frequently torn by projections and wrecks which have spoilt some of the best trawling beds on the South Coast.

Another method of fishing with nets is by the use of seines or scans.



SEINE NET, READY FOR BEING HAUL IN.

or shoal of fish. The fish are caught by the gills, which become entangled in the netting. The nets, which are long and straight, may be used at the surface, as is most commonly the case, or at different depths, by means of weights and buoys. Fishing by drift-net is carried on off Cornwall for pilchard, with nets 40 fathoms by 4, having 40 meshes to the yard, for mackerel, with nets 20 fathoms by 16, with 28 meshes to the yard, and for herrings, with nets 40 fathoms by 4½, with 36 meshes to the yard; off the E. coast and the Scottish shores for herring, with nets 30 fathoms by 9; and at the E. end of the Channel for mackerel. Ground fish, such as cod and turbot, are also caught by sunk drift nets. The fishing is carried on in Cornwall from about five in the afternoon till eight or nine in the evening, this being the time when shoals of pilchard and such fish spread out, all the fish heading away from the land. Each boat shoots a 'fleet' of nets, numbering from sixteen to twenty for pilchard and herring, and eighty for

These are long nets, weighted below and buoyed above, which are dragged around a shoal, the fish being then brought in them either to the shore or the boat. In its simplest form, seining is carried on from shore. One end of the net is fixed on the beach, the rest of the net is taken on board a boat and dropped over the stern as the boat makes a semicircle. When the vessel again reaches shore, the net is brought in by means of the two ends being drawn together either by man-, horse-, or steam-power. A level bottom is necessary for this operation, which is largely performed on sand-banks, in river estuaries, as in the sand-eel fishery at Teignmouth. A more complicated type of seining is that carried on at St. Ives for pilchards during the late summer and autumn. This involves the use of a seine-boat, 32 ft. long, and manned by six rowers and two men to work the net, two boats with the 'stop net,' and a fourth boat, known as the 'lurker,' from which directions are issued. The seine measures 160 fathoms by 6 or 8 ft.,

and the stop-net is 70 or 80 fathoms long. The pilchard fishery is protected by very stringent regulations, and has some interesting customs in connection with it, such as the employment of 'huers,' who signal the approach of shoals from look-out stations. A variation of the seine is the purse-seine, used in deep water for mackerel, which has a rope run through the bottom, so that it can be drawn up into a large bag, which encloses the fish. Purse-seines are 900 to 1500 ft. long, and 160 to 180 ft. deep, and are set by large rowing boats accompanying the seine-boat.

The trammel is an ingenious arrangement consisting of three walls of netting, set alongside each other, of which the middle one has a much smaller mesh and is set much more loosely and slackly than the two outer ones. The nets are set up and down the tide, and a fish, striking through the large mesh of one of the outer nets into the small-meshed centre one, carries this with it through the large mesh of the third net, and is thus imprisoned in a bag of the small meshed and slack middle net. A trammel is usually 40 to 50 fathoms long and 1 to 1½ fathoms deep, with the two outer nets of a 12 in. mesh, and the inner one of a 2½ in. mesh. Red mullet, bass, and lobsters are largely caught by this means, particularly off the Cornish coast.

There are numerous minor varieties of nets. The fyke net is a long cylindrical bag kept open by hoops, which terminates in a pocket entered by a funnel-shaped opening, through which the fish will not return. Long straight nets, termed leaders, extend from the mouth to direct the fish towards it. The fyke net is set in fairly deep water, at the bottom. The pound net has a long straight leader, running out from shore to a bag-like net from which the fish cannot escape. Fish swimming along the shore come against the leader, and in attempting to swim round it, follow it down to the enclosure at the end. Pound nets are set in rather shallow water and are supported by stakes. Another type is the Lancashire stake net, a long straight net 900 ft. long and 3 ft. wide, which is stretched across the tide on stakes. The fish, mostly plaice, are entangled in its meshes, and taken out when the tide goes down. Plaice are also caught in the hedge-baulk, which is a net set between long wicker walls. The stow, or bag net, is used in the Thames estuary, the Solent, the Lynn estuary, Boston Deep, and the Firth of Forth. It is a kind of moored beam-trawl, being a large funnel-shaped bag 60 yds. long,

and having an opening 20 to 30 ft. sq. The fishing is from an anchored boat, and the flowing or ebbing tide carries the fish into the mouth, which is kept open by wooden spars. Sprats, herrings, and other small fish are caught in this way. The ground or set net works on the same principle as the drift net, but is anchored upright on the sea bottom. Herring, cod, turbot and skate are captured by this means. Oysters are caught by a dredge resembling a beam-trawl, with the netting made of iron rings and the beam of iron also.

Traps are only used for crabs and lobsters. In the most common pattern a framework of wicker or wood is covered with netting. A bait is placed inside, and the opening is so arranged as to prevent the escape of the crab, etc., when once inside.

Regulation of fisheries.—The control of the fisheries of Great Britain was, from 1889–1903, vested in the Fisheries Department of the Board of Trade. In 1903 these functions were transferred to the Board of Agriculture and Fisheries, now the Ministry of Agriculture and Fisheries. A special fisheries division of this Ministry performs certain duties assigned by Acts of parliament relating to the subject, and also represents the nation in the International Fisheries Investigation, etc. Fishery returns and statistics are dealt with by the statistical division. The offices of the Ministry are in Whitehall Place, St. James's Square, and Parliament Street, London. There is a separate Fishery Board for Scotland (q.v.). It may be of interest briefly to consider the history of the administration of British sea-fisheries. The first effort to obtain definite and authoritative information on the state of sea-fisheries was made by the Royal Commission of 1860, which consisted of Mr. John Caird, Professor Huxley, and Mr. G. Shaw-Lefevre. This reported in 1866 that the sources of supply gave reason for no uneasiness, and that fishing by all means should be allowed unrestricted freedom. The recommendations of the committee were included in the Sea Fisheries Act of 1868. Another Royal Commission in 1878 made an inquiry into the effect of the use of beam-trawls and ground seines upon fish spawn and fry. The Fishery Board for Scotland was instituted in 1882, upon the dissolution of the Board of British White Herring, and in 1885 this body, by the Sea Fisheries (Scotland) Amendment Act, closed the Firth of Forth and St. Andrews Bay to trawlers. Experimental trawlings made over this protected area by a government steam-yacht seem to show very little

change in either direction as a result of this legislation. The Board established a laboratory and sea-fish hatchery at Dunbar in 1893, and this was removed to Aberdeen in 1900. A Royal Commission in 1883 for inquiry into the damage done to line and net fishing by the use of the trawl resulted in the establishment of fishery statistics (1885-87). The foundation in 1884 of the Marine Biological Association of the United Kingdom, which receives a gov. grant, has done much to assist the scientific study of marine biology. The Sea Fisheries Regulation Acts of 1888-94 provided for the establishment of local committees with powers for the regulation of coast fisheries. In 1892 the Scottish Fisheries Board closed the whole of the Moray Firth to trawlers; a regulation which has largely failed in its effect, since the area concerned is very large and the rule cannot be enforced upon foreign vessels. A select committee of the House of Commons, sitting in 1893, recommended the adoption of a size-limit for the sale of several kinds of fish, in order to prevent the destruction of immature fish. The Bill framed on the recommendation failed to pass through parliament. In 1899 the control of Irish fisheries was vested in the Department of Agriculture and Technical Instruction for Ireland. In 1901 Sir Colin Scott-Moncrieff, K.C.M.G., supported by Mr. D. A. W. Thompson, Mr. W. Garstang, and Dr. H. R. Mill, represented the British gov. at an International Conference having reference to the scientific investigation of the North Sea fishing grounds. In 1902-3 the Fishery Board for Scotland, and the Marine Biological Association began work on this investigation which had been entrusted to

Great Britain, and the first set of reports was issued in 1909. Some valuable recommendations were made in 1902 by the committee on Ichthyological Research, appointed by the Board of Trade, and further suggestions were made by a departmental treasury committee in 1907, all urging the continuation and extension of scientific research on subjects connected with the fisheries. The regulation of gov. aid to such investigations is now in the hands of the Development Commission, which, up to March 1912, had recommended to the Treasury a grant of £6440 for the improvement of the fisheries of England and Wales, a loan of £9000 for the provision of modern fishing-vessels in Ireland, and a grant of £46,750 for the improvement and development of Irish fisheries.

The right of fishing in British territorial waters belongs solely to British subjects, and can only be claimed by foreigners by convention. This right strictly belongs to the crown, but the royal right is only claimed in certain cases, *e.g.* whales, sturgeons, porpoises and grampuses are 'royal fish,' and crown property by whomsoever they are caught, and salmon, oyster, and mussel fisheries are still held by the crown. On the high seas, outside territorial waters, the right of fishing is open to all, but may be regulated by custom or convention. Such conventions were made between Great Britain and the U.S.A. in 1818, 1872, and, as a result of the Behring Sea Arbitration, in 1892; between Great Britain and France in 1839 and 1867, and between the countries having a North Sea seaboard in 1882.

Statistics of British Fisheries.—During 1929 the quantities of sea-fish landed in Great Britain, excluding salmon and shell fish, were:

	England and Wales.	Scotland.	Ireland.	Total.
	Tons.	Tons.	Tons.	Tons.
Cod	152,600	27,900	1,000	181,500
Haddock	103,000	51,000	200	154,200
Hake	35,500	1,500	100	37,100
Herring	210,500	202,700	9,000	422,200
Mackerel	6,500	3,000	4,000	13,500
Plaice	31,700	2,800	500	35,000
Skate and Ray	22,300	6,600	500	29,400
Whiting	27,700	12,200	700	40,600
Other	134,400	31,000	1,000	166,400
	724,200	338,700	17,000	1,079,900

The values of other catches including shell fish were: England and Wales, £14,822,401; Scotland, £4,773,699; Ireland £314,812. Total £19,910,912. In addition to this harvest of the sea Great Britain and Ireland imported during 1929.

From Deep Sea Fisheries	1,276,056	cwt. valued at	£1,096,989
„ British Possessions	482,677	„ „ „	1,909,052
„ Foreign Countries	3,506,226	„ „ „	10,367,281

Re-exports during 1929 were :—

To British Possessions	281,346	cwt. valued at	£790,078
„ Foreign Countries	216,173	„ „ „	£870,925

During the last five years the following quantities of fish have been exported :—

1925	6,757,131	cwts. valued at	£7,524,620
1926	7,274,817	„ „ „	£7,373,433
1927	7,680,000	„ „ „	£7,000,982
1928	7,700,414	„ „ „	£7,544,173
1929	8,298,439	„ „ „	£7,917,807

The following list shows the number of ships and boats employed during the past five years in England and Wales, and rated under three descriptions, A, B and C, according to size and equipment, A being the finer steam and sailing vessels and C small sea-fishing craft.

	1925.	1926.	1927.	1928.	1929.
A . .	2717	2626	2564	2472	2427
B . .	3994	3899	3827	3766	3727
C . .	2755	2610	2374	2129	no returns
	9466	9135	8765	8367	

The total number of men employed during the same period has been :—

	1925.	1926.	1927.	1928.	1929.
Regularly Employed	31,506	31,088	30,556	30,203	Figures not completed
Partly Employed	4,438	4,297	3,940	3,889	

Of English fisheries, the trawl fisheries for cod, haddock, and flat fish yield about three-fourths of the total amount landed, the remaining quarter being mainly supplied by drift-net fisheries for herring and mackerel. In Scotland net-fisheries for herring, etc. yield rather more than half of the total, trawling nearly three-eighths, and line fisheries an eighth. In Ireland three-fourths of the total is provided by mackerel and herring fisheries and the remaining quarter by trawling. The fishing industry of the British Isles far exceeds that of any other European country in all respects. For example, in 1907 the number of steam trawlers owned by the British Isles was 1615, while next on the list came Germany with 239, and France with 224, and the value of the fish landed in these islands is nearly twice that landed in any other European country. Returns as to steam-trawlers show that while British vessels are more and more leaving the North Sea and going further afield, their place is taken by continental vessels. Great Britain is responsible for more than a third of the total haul of the fisheries of Europe.

American Fisheries.—United States. The fisheries of the United States are very important and increasing in prosperity year by year. In 1929 they employed 190,000 men; in vessels and boats valued at over \$200,000,000, of which 26 per cent. consists of steam trawlers; and landed 1,300,000 tons of fish valued at over a hundred million dollars. Though many American boats fish in the waters off Canada, Newfoundland, etc., by far the larger part of the total catch comes from American waters. The Atlantic fisheries, particularly those of the middle Atlantic states, are considerably more profitable than those carried on off the Pacific seaboard. The most valuable product is the oyster, nearly half of the yield coming from cultivated oyster farms. Virginia is the leading state in this industry. Salmon are largely caught in the Pacific, and cod, haddock, hake, halibut, mackerel, herring, shad, clam, and lobsters in the Atlantic. The whale fishery of the States, formerly carried on to a large extent in the North Pacific and the Arctic Oceans, has very much diminished of late years.

Canada.—The Canadian fisheries

are very extensive, though still exceeded by those of the United States, and they are continuing to increase under careful government supervision and assistance. The fish caught are, in order of value, salmon, cod, lobsters, herring, and mackerel. The canning of salmon (from the Pacific coast) and lobsters is an important industry, and the finished product is largely exported. The provinces engaged in the fishing industry are, in order of the value of their produce, British Columbia, Nova Scotia, New Brunswick, Ontario, Quebec, and Prince Edward Is. There is also a large seal fishery in the Behring Sea (*see CANADA*).

Newfoundland.—The S. F., mainly for cod and herring, on the Newfoundland Banks form the principal occupation of the population. Fishing is also carried on in these waters by British, American, and French vessels, and several conventions have been made to regulate international rights, notably the Anglo-French Convention of 1904, and the award in 1910 of The Hague Tribunal on the Newfoundland fisheries dispute. The cod fisheries are the most important, and are carried on on the Banks and off the shores of Newfoundland and Labrador, and the catch also includes seal, herring, lobster, salmon, and trout. Lobster-canning for export is an important industry. Cod is largely dried, and exported to Brazil, Spain, Portugal, the United States, and the W. Indies (*see NEWFOUNDLAND*).

European Fisheries—

Belgium.—The Belgian North Sea fishery is carried on from Ostend, Blankenberghe, Heyst, La Panne, and Nieuwpoort. Ostend has 360 vessels employing 1500 men who during 1929 landed 150,000 tons valued at £502,800. Belgium being a manufacturing country also imports much fish.

Denmark.—There are important Danish fisheries in the Baltic, for plaice, flounders, eels, herrings, cod, and garfish; in the North Sea for plaice, haddock, lobsters, and cod; off Iceland and the Faeroes for cod and herring, and off Greenland for seals, whales, salmon, trout, halibut, and cod. In 1929 Denmark had 8033 fishing vessels of all sizes, 18,780 men were employed in fishing, and the value of fish landed was £2,018,000.

France.—The French fishing industry is very important and receives much gov. aid. The Great Fishery for cod is carried on off Newfoundland, off Iceland, and in the North Sea. The French fishing fleet consists of upwards of 18,000 boats and vessels, and gives employment to

70,600 men. In 1929 216 million kilogrammes of fish were landed having a value of over seven million pounds. France has important fisheries at Newfoundland and nearer home a very important trade in sardines.

Germany.—The German fishing industry, particularly in the North Sea, has recently developed to a considerable extent. Steam trawling now takes place from Gessemunde, Bremen, and Bremerhaven, and a deep-sea herring fishery, on the Dutch model, has been established at Emden. In 1929 174,498 men and 13,668 boats were employed in fisheries, landing 6,320,000 cwt. of fish valued at £4,273,800.

Greece.—Sardines, anchovies, tunny fish, mullet, eels, and mackerel are caught, but the chief fishery is for sponges, the exports of which in 1910 amounted to £104,434.

Holland.—The Dutch fishery products include herring (mainly off the E. coast of England), cod, ling, anchovies, smelts, eels, flounders, shrimps, and oysters. There are exports of fresh and salted fish. In 1929 5154 vessels were engaged and landed 2,940,000 cwt. of fish valued at £2,960,000. Oysters are cultivated and form a profitable part of the industry.

Iceland.—About 1500 boats and vessels are employed in the F. of Iceland, which gives occupation to 8900 men. The value of the fish secured during 1929 amounted to over £1,800,000.

Italy.—Tunny fish is the chief product of Italian fisheries, but sardines, anchovies, hake, swordfish, lobsters, cuttlefish, oysters, sea-urchins, turtles, and sharks are also caught, and there are valuable fisheries for sponges and coral.

Norway.—The chief Norwegian fisheries during 1929 employed 102,600 men, and yielded produce of the value of £4,722,000. Herring, cod, and mackerel are the chief fish caught; other kinds are salmon, sea-trout, lobsters, ling, coal-fish, torsk, and oysters.

Poland.—The Polish fisheries are chiefly those taken over in consequence of the political changes following the war, these are small and give employment to about 1280 men. The value of the fish obtained was about £75,000 during 1929.

Portugal.—The fisheries of Portugal, which employed about 30,000 men during 1929, secured fish to the value of £5,280,000. The most profitable part of the industry is sardine fishing, which accounts for nearly half the employment. Tunny fish are also caught, and whales off the Azores.

Russia.—Fishing in Russia is almost entirely carried on inland; the S. F. of the Baltic, White and Black Seas, the Bothnian Gulf, etc., only providing a small percentage of the total amount. These produce cod, herring, and whales. Cod and herring are imported. Owing to political events statistics are few and unreliable.

Spain.—The most important products of the Spanish fisheries are sardines, tunny fish, and cod. Eels, lampreys, hake, bream, and salmon are also caught. The preservation of sardines and tunnies forms an important industry, employing thousands of workers in great numbers of trades in the tinning of sardines. The value of the produce was about £5,280,801. There are large imports of dried cod, etc.

Sweden.—Swedish fisheries, for long regarded as unimportant, show signs

which was simultaneously dissolved. Investigations had been made and plans had been brought forward to prevent the destruction of the spawn of sea fish, and the F. B. for S. was entrusted with the task of improvement. Experiments were made, and with the assistance of a government grant of £3000, a steam yacht was purchased, the Firth of Forth closed, and a laboratory and sea-fish hatchery established. A comprehensive programme of investigations has since been carried on successfully with international co-operation. The important new regulations of the Salmon and Fresh Waters Fisheries Act of 1923 do not apply to Scotland.

Fishguard or Aberavon, a seaport tn. of Pembroke, Wales, situated at the mouth of the Gwaen in P. Bay, 25 m. N. of Pembroke, and 258 m. from London. It is one of the seven



FISHGUARD HARBOUR

[G. W. R. Photo.]

of improvement. In 1929, 22,280 men were employed, and landed fish to the value of £1,400,000 (British). Deep-sea line fishing is carried on at the Kattegat and in the North Sea. Much of the fish is salted.

Fisher Marten, see PEKAN.

Fisher's Hill, a precipitous bluff in the Shenandoah valley, Frederick co., Virginia, U.S.A., 30 m. S.W. of Winchester. It is noted for a battle fought there in 1864, when the Federal troops under Sheridan gained a victory over the Confederates under General Early. The former lost about 1300 men, while the latter lost 530.

Fisher's Island, an island in Long Island Sound, New York, United States. It belongs to Suffolk co., and is 8 m. long, with an average of 1 m. in width, and an area of 4000 acres. It is separated from Connecticut by Fisher's Island Sound, a narrow channel. The surface is hilly. Pop. 300.

Fishery Board for Scotland was instituted in 1882 to take the place of the Board of British White Herrings,

Pembroke boroughs, and is divided into two parts; the upper portion stands high up on the cliffs, overlooking the harbour, and contains the parish church, market-place, etc., while the lower town, joining the quay, is occupied by the fishermen. The bay affords good shelter and anchorage. The depth of its fine natural harbour at the entrance is 14 ft. at high water and 8 ft. at quayside. P. is a port of call for Cunard liners from New York and Booth liners from S. America, and the Great Western Railway Company runs a service of passenger and freight steamers to Rosslare, Waterford, and Cork, the first of which is the shortest sea passage from England to Ireland. Pop. 3000.

Fish-hawk (bald buzzard), see OSTRICH.

Fish-hooks. These were, in very early times, made of stone, bronze, copper, and sometimes shell, as relics belonging to a prehistoric era have been discovered. In spite of their antiquity, however, some of

them resemble very closely those of modern times, though some seem to have been quite original in idea, as those made of the spine of a cactus and used by Indians. The place in England where F. are principally made to-day is Redditch. They are usually composed of soft steel wire, afterwards hardened and polished, and may be manufactured either by hand or machinery. Their shapes differ, and the number of designs which are executed is considerable. The one most generally in use has the point parallel to the shaft, although some anglers prefer it bent in another direction. The ends also may be ringed, flattened, or simply plain.

Fish-lice, the name generally applied to any of the copepod crustaceans which are parasitic on fishes; there are many genera and species, which are ectoparasitic, as *Caligus* (q.v.), or epizoic. See EPIZOA.

Fish River, see GREAT FISH RIVER.

Fish River Caves, see BLUE MOUNTAINS and JENOLAN CAVES.

Fisk University is at Nashville, Tennessee, and was founded in 1866, and named after General Clinton B. Fisk, to whose efforts its progress is largely due. It is intended for coloured students, who now number over 350. It was from this university that the 'jubilee singers' were sent to travel in various parts of the world, and to raise money for the upkeep of the university.

Fiske, Bradley Allen, b. Lyons, New York, June 13, 1854. He graduated from the U.S. Naval Academy in 1874. In the Spanish American War he was navigator of the *Petrel* in the Battle of Manila, winning the commendation of Admiral Dewey for heroic conduct. He served in subsequent naval engagements with the rebel Filipinos, and commanded various divisions of the Atlantic fleet. He was aide for operations in the Navy Department from 1913 to 1915, when he resigned. He has invented many improvements for the technique of warships. His naval telescope and torpedoplane sight have been adopted by the leading navies of the world.

Fiske, John (1842-1901), an American writer and philosopher, b. at Hartford, Connecticut. In 1869 he was appointed lecturer on philosophy at Harvard, and in 1881 at St. Louis University. His first great philosophical work in literature was *Outlines of Cosmic Philosophy*, 1874, followed very soon by many other works of the same kind. After about the year 1885, however, he spent his time in studying American history, on which subject also he has written

a number of valuable works. He is the author of: *The Unseen World*, 1876; *The Origin of Evil*, 1899; and of historical works such as: *The Discovery of America*, 1892; *Old Virginia and her Neighbours*, 1897; *New France and New England*, 1902.

Fistularia (Lat. *fistula*, a pipe), the generic name of a fish belonging to the family of Aulostomatidae, or flutemouths. It is characterised by a long tubular muzzle, terminating in a small mouth, and by the pelvic fins consisting of six soft rays. The body is naked and the forked caudal fin has one or two of its middle rays produced into a long whip-like filament. This genus inhabits the tropical Atlantic and Indian Oceans, and the family is closely allied to that of the sticklebacks (q.v.).

Fistulina, a genus of hymenomycetous fungi, of which one species, *F. hepatica*, is common to Britain. It grows principally on old oak trees, and is liver-like in appearance. It is used in some countries for edible purposes, and when cooked is said to resemble grilled meat.

Fitch, John (1743-98), b. in Connecticut. He was the first man to build a steamboat in America, and when completed made a successful trip on the Delaware in 1787. F. himself was not, however, successful in America, though a boat built later on by Robert Fulton on F.'s plan was accepted. He eventually committed suicide, owing to his vain efforts to make a living.

Fitch, Sir Joshua Girling (1824-1903), English educationist. About 1883 he became chief inspector for the eastern division, and later on inspector of training colleges. In addition to this, he was connected with education in America, with the higher education of women in England, and was an examiner of the London University.

Fitch, Ralph (fl. 1583-1606), a traveller, and is remembered as the pioneer among Englishmen who took the overland route to India. He set out in 1583 and returned in 1591. The account of this journey was published by Hakluyt in 1598. See J. Horton Ryley, *Ralph Fitch, England's Pioneer to India and Burma*, 1899.

Fitch, William Clyde (1865-1909), an American playwright, b. and educated in New York, where his first play was produced in 1890. He has written a large number of dramas, among them being: *Beau Brummel*, 1890; *The Moth and the Flame*, *Nathan Hale*, 1899; *The Cowboy and the Lady*, *Barbara Frietchie*, 1900; *The Climbers*, *The Girl with the Green Eyes*, 1905; and *The Last of the*

Dandies, played at His Majesty's Theatre, London.

Fitchburg, a city of Massachusetts, U.S.A., in Worcester co. It is situated 50 m. N.W. of Boston on a branch of the Nashua R. The principal manufactures are pulp, cotton, and woollen goods, saws, machinery, bicycles, etc. There are granite quarries. Pop. about 43,600.

Fitches, or **Tare**, see **VETCH**.

Fittig, **Rudolf** (1835-1910), Ger. chemist; b. Dec. 6, at Hamburg. Studied chemistry at Göttingen. Assisted Wohler, the organic chemist, in 1858. Taught in Göttingen, 1860-70. Professor of chemistry at Tübingen, 1870-76; thenceforward professor at Strassburg. Discovered the lactones, or anhydrides of oxyacids. Synthesised several hydrocarbons. Discovered phenanthrene. Re-edited Wöhler's works; and wrote *Ueber Aceton*, 1858; *Das Wesen und die Ziele der chemischen Forschung und des chemischen Studiums*, 1870; *Grundriss der unorganischen Chemie*, 1872. Received the Davy medal of the Royal Society, 1906. Died at Strassburg, Nov. 19.

Fiton, **Mary** (fl. 1600), the daughter of Sir Edward F., a native of the co. of Cheshire, England. She was a maid-of-honour at the court of Queen Elizabeth, and was one of the performers in the masque at the wedding of Lord Herbert in 1600. Some people have identified her with the 'dark lady' of Shakespeare's sonnets.

Fitz, from the Norman-French word *fiz* (Lat. *filius*), meaning 'son.' It was and is used as a prefix to a surname to show descent—as the Scotch prefix *Mac* and the Irish *O'*—appearing in such words as Fitzwilliam and Fitzhamilton. It was also used as the surname of illegitimate children of kings or princes, as in FitzJames and Fitzclarence.

Fitzgerald, a small tn. of Georgia, United States, situated in Irwin co., 25 m. N.E. of Tifton. Pop. (1910) 5795.

Fitzgerald, **Lord Edward** (1763-98), a son of the first Duke of Leinster; served in the British army until 1792, when he was cashiered for being present at a revolutionary meeting at Paris. He was described by Cobbett, who served under him in the 54th Regiment, as the only really honest officer he had even known. He now threw in his lot with the United Irishmen, and began to prepare schemes for a rising in that country. It was impossible for the government to ignore his action, and after he had been given an opportunity to escape to France he was taken prisoner. A wound that he had received in the struggle mortified, and he d. in

Newgate on June 4. There is a biography by Thomas Moore.

Fitz-Gerald, **Edward** (1809-83), poet, went to Trinity College, Cambridge, in 1826, and there made lifelong friendships with the Tennysons, Thackeray, Spedding, Donne, W. H. Thompson, and the rest of the coterie. When he came down from the university he settled at Woodbridge. He found pleasure in letter-writing and in boating, but his principal interest was in books. In 1851 he published anonymously *Euphranor, a Dialogue on Youth*, and in the following year *Polonius, a Collection of Wise Sayings and Modern Instances*. He issued in 1853 a free translation of *Six Dramas of Calderon*, and six years later gave to the world his rendering of Omar Khayyám, which has made him famous in all the English-speaking countries and has passed through innumerable editions. Other and more 'faithful' translations have been produced, but none approaching that of F. for 'glow' and 'atmosphere.' His complete works and correspondence were edited in 1902 by Aldis Wright, and there are biographies by Groome (1895), Thomas Wright (1904), and A. C. Benson (1905).

Fitzherbert, **Maria Anne** (née Smythe) (1756-1837), was a Roman Catholic and the wife of George IV., though not openly acknowledged as such. She had been twice married before meeting George—then Prince of Wales—to whom she was married in 1785—the marriage not being valid, as it had taken place without the king's consent. On marrying Princess Caroline he, for a time, severed his connection with Mrs. F., but it was not finally broken until 1803.

Fitzjames, see **BRIEWICK**, **JAMES FITZ-JAMES**, **DUKE OF**.

Fitzmaurice, **Edmond George Fitzmaurice**, **Baron** (b. June 19, 1846), son of the fourth Marquis of Lansdowne, was educated at Eton and Cambridge. In 1869 he became an M.P., representing Colne until 1885, and the Cricklade division of Wiltshire (1888-1905). Raised to peerage Jan. 1906. Among the various offices which he has filled may be mentioned those of Under-Secretary for Foreign Affairs (1882-5, and 1905-8); Chancellor of the Duchy of Lancaster (1908-9), and at the present time trustee of the National Portrait Gallery, while at the Danube Conference of 1882 he was second plenipotentiary. Among his literary works are: *Life of William, Earl of Shelburne*, 1875-77; *Sir William Petty, the Political Economist*, 1893; *Lettres de l'abbé Morellet*, 1898;

Charles William Ferdinand, Duke of Brunswick, 1901; and *The Life of Granville George Leveson-Gower, second Earl Granville*, 1905.

Fitzmaurice, Sir Maurice (b. 1861), a chief engineer of London County Council (1901-12), graduated as M.A. and M.E. from Trinity College, Dublin. He is lieutenant-colonel of the Engineer and Railway Staff Corps. Among his engineering works are the Rotherhithe tunnel, the subway for electric trams below Kingsway; and the electric tramways, and the duplication of the main drainage system of London.

Fitzmaurice-Kelly, James (b. 1858), was in 1900 examiner in Spanish at the University of Oxford, and Taylorian lecturer at the same university in 1902. In 1907 he was lecturer for the Hispanic Society of America, and in 1907-8 at the London University, while in 1908 he was Norman M'Coll lecturer at Cambridge. His literary work, which is chiefly on the literature of Spain, includes: *The Life of Miguel de Cervantes Saavedra*, 1892; *Un Hispanófilo inglés del Siglo XVII.*, 1899; *History of Spanish Literature*, 1898; *Lope de Vega and the Spanish Drama*, 1902; *Chapters on Spanish Literature*, 1908. He is also one of the contributors to the *Encyclopædia Britannica*.

Fitzroy: (1) A city of Victoria, Australia, in Bourke co. It is 2 m. N.E. of Melbourne, and it forms a suburb of that place. Pop. 35,000. (2) A river of Queensland, formed by the junction of the Dawson and Mackenzie rivers. It flows eastward into the Pacific, near the Tropic of Capricorn, at Keppel Bay, and is navigable from its mouth for 35 m. to Rockhampton. (3) The largest river of Western Australia, whose source is in King Leopold Mountains. It has a westerly course, flowing through beautiful well-watered plains, and finally enters King Sound. Steamers navigate the river 100 m. from its estuary. The source of the F. was discovered in 1842 by Stokes, although the river itself was not explored until 1897.

Fitzroy, Robert (1805-65), an Eng. admiral, hydrographer, and meteorologist. From 1828-30 he captained the *Beagle*, then employed in a survey of the coast of Patagonia, Tierra del Fuego, Chili, and Peru. It was during this voyage that he discovered the inland sea called Otway Water and its connection with the salt Skyring Water by means of what came to be known as Fitzroy Channel. During a circumnavigating voyage in the *Beagle* in 1831-36, when Charles Darwin accompanied him. F. not only ran a chronometric line round the world, but recorded a number of

invaluable meteorological observations, the most famous of which are his 'storm warnings.' These were all gathered together in his *Weather Book* of 1863.

Fitzstephen, William (d. c. 1191), biographer of Thomas à Becket, wrote in 1174 his valuable if biased *Life and Passion of Archbishop Becket*, which he published together with his *Description of the City of London*. A translation of the latter, which, except for the Domesday Book, gives the earliest topography of the metropolis, is embodied in Stowe's *Survey of London*. F. was a devoted adherent of Becket, dining at his board and serving as remembrancer in his chancery and sub-deacon in his chapel, and was, moreover, one of the few who loyally stood by his master at his death.

Fitzurse, Reginald (fl. 1170), enjoys an evil notoriety as one of Becket's murderers. With his three confederates he determined to fulfil the prayer uttered by the king in a momentary passion, and after the deed was done suffered excommunication, and with his fellow knights was exiled, it is said, to Palestine, where he d. within three years of his crime.

Fitzwilliam, William Wentworth, second Earl Fitzwilliam in the peerage of the United Kingdom (1748-1833), succeeded in 1782 to the estates of his uncle, Lord Rockingham, and was henceforth one of the richest peers of his day. An enthusiastic Whig, he was one of the Duke of Portland's party who coalesced with Pitt in 1794, and was later in the year appointed Lord-Lieutenant of Ireland. He held this office only for a few months, being recalled for supporting the Roman Catholics' claims in defiance of his instructions. He was President of the Council in 1806 under Grenville, but after this did not again take office.

Fitzwilliam Museum, which is at Cambridge, possesses an excellent collection of engravings, MSS., and books left by its founder, Viscount Fitzwilliam, on his death in 1816 to the university. The building itself is a beautiful example of Greek architecture.

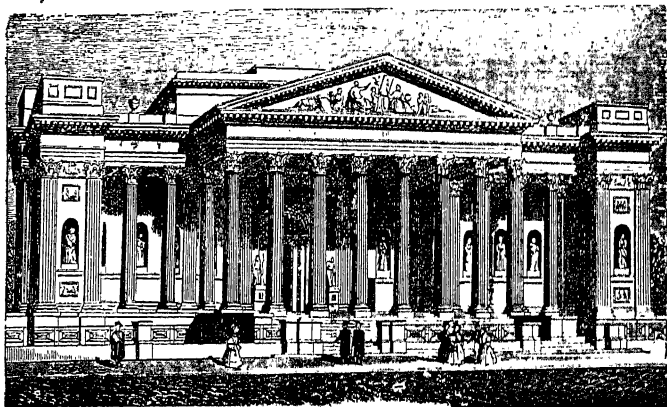
Fiume. Few places have been more often contested throughout their history. It is first mentioned in the thirteenth century, since when it has successively been the property of Austria, Croatia, France, Austria, Hungary and Croatia again. It was finally ceded to Italy in 1924. The pop. of Fiume is distributed somewhat as follows—Italians 24,000, Magyars 5000, Croats 15,000. The preponderance of Italians has been a vital factor in settling the post-war

question of its disposal. It owes its importance to being the terminus of a railway from Budapest and to the fact that it is one of the very few ports on the E. Adriatic. For about fifty years before the Great War the Italians and Magyars united in opposing any scheme to extend the political and municipal franchise to the suburb of Sushak, which was mainly Slav. Fiume (without Sushak) gradually became an Italian-Magyar city in appearance, while Austria spent much money on the shipping which was owned by Croats.

By the secret Treaty of London (1915), under which Italy entered the Great War, Fiume was given to the

tried to arrest them on Jan. 4, 1642, so as to prevent Henrietta Maria's impeachment. This foolish endeavour undoubtedly hastened the Civil War.

Five Mile Act, The, passed in the reign of Elizabeth, penalised Roman Catholics, who had been convicted of non-attendance at the Protestant church, for going a greater distance than five miles from their homes. A more famous and less stringent Act of the same name was passed in 1665, whereby no nonconformist preacher or teacher could come within five miles of any town or borough corporate or any place whatever where he had preached or taught since the Act of Oblivion (1660) unless he first



THE FITZWILLIAM MUSEUM (1813)

Croats; but after the war Italian political writers claimed it for Italy on the ground that their nationals were predominant. To put matters beyond doubt Gabriele D'Annunzio (*q.v.*), the poet and novelist, took matters into his own hands by collecting a small force, with which he raided and occupied the place in Sept. 1919. Although this venture was not officially 'noticed' to any serious extent, it was approved by many influential Italians. Various attempts were made to eject him which, however, did not at first succeed. Eventually Fiume was ceded to Italy in 1924 in spite of the protests of other nations concerned, especially Yugo-Slavia.

Five Members, The, of parliament, were John Pym, Denzil Hollies, Sir Arthur Haselrig, William Strode, and John Hampden. In violation of all constitutional liberties, Charles I.

took the oath of non-resistance and pledged himself not to interfere either with the church or state. This law remained in force till 1689.

Fives, a game of handball, played by two or four players in a court enclosed on three or four sides. It is at least as old as the fourteenth century, and is almost certainly derived, like racquets, from the French 'jou de paume,' which became known in England as 'hand-tennis.' Various explanations of the name have been offered, the most feasible being that it refers to the five fingers. To-day it is not played much outside schools and colleges, but it retains a deserved popularity with schoolboys, the Etonians especially being partial to the game. In America it is called 'hand-ball,' and the courts are sometimes 60 ft. long as compared with 34 ft., which is the normal length in this country. F. is a very healthy form of

sport, as it is played in the open air and exercises every limb of the body. In winter, indeed, it is one of the pleasantest means of promoting a good circulation in a small space of time. There are many varieties of courts, and the codes of rules will be found to differ fairly extensively in different public schools, but a brief description of Rugby F. and of the points in which Eton F. is at variance will give the reader some notion of the nature and objects of the sport. To begin with, no apparatus is necessary except the ball, which is commonly made of white leather, stretched over a firm cork foundation, and, if the player chooses, a pair of padded gloves. The court consists of a front and two side walls, these latter usually sloping towards the back, often from 12 to 20 ft. It may be roofed or otherwise, and sometimes has at the back a dwarf wall or projection. It is invariably divided into a fore and back court, technically known as 'on' and 'off' wall, and in a 'double,' when there are two partners a side, these stand diagonally to one another. Thus the server or 'hand-in' stands in the fore-court nearer the left wall, one of his opponents standing opposite to him in the same court. The other two players guard the 'off' wall. 'Hand-in' serves, and must hit the ball with his hand against the front wall above a line, marked with a board or other device at least 3 ft. above the ground-level, in such a way as to cause it to rebound from the right-hand side wall on to the ground on the 'off' wall. 'Hand-out,' that is his opponent in the fore-court, may refuse the serve if he likes, but the game cannot proceed till he has returned one of the server's strokes. After his 'first-cut,' or return, the ball is kept flying by either side alternately, there being no restriction as to which of the two partners hits the ball at any time. The winning side is that which first scores fifteen points; the server only can score, and wins a point when the opposing side misses a point, that is, fails to keep the ball going. If he loses a stroke, his partner becomes 'hand-in' until he too fails, when the other side has its innings. In any return the ball may be volleyed and may be made to touch one or both of the side walls beside the front, which all the players face, and which must invariably be hit above the horizontal line or plank already referred to. At Eton the game was first played against the chapel walls, buttresses serving as side walls and the steps projecting from the side. The steps in the proper F. courts became the famous 'pepper-box,' which juts out

from the left side wall, making the game considerably more intricate, whilst the stepped platform or dais leading to the flight of chapel steps gave rise to the 'hole,' that is, the space between the pepper-box and the step which was introduced to break the level of the F. court floor.

Fixed Stars, see STARS.

Fixtures. Generally speaking, the term F. denotes anything in the nature of personal property that has become annexed to the freehold so as to become part and parcel of it. More popularly, F. may be defined as things of an accessory nature annexed to houses or lands. The justification for the old common law doctrine of the irremovability of F. was that if any limited owner, *e.g.* a tenant for life or for years, removed the F., he necessarily committed 'waste,' *i.e.* an act of destruction which injures or diminishes the value of the inheritance; and, further, that the mere fact of annexation indicated an intention to abandon his ownership in the F. From early times the common law rule was relaxed in favour of the principle that the circumstances of the annexation might show an intention in the parties to the contrary of the common law presumption. The degree and object of the annexation became all-important, and the rule became established that whatever chattel was annexed, merely for its more complete enjoyment and use as such, could be removed, but that where the purpose of the annexation was the improvement of the freehold, the chattel was irremovable. This obviously did not go far enough. However much a tenant for life under a marriage settlement may desire to improve the freehold, no thought could be further from the mind of a trade tenant, or, indeed, any tenant having no sort of relation other than contractual with the freeholder. Consequently, the law in its relaxation of the old doctrine, on grounds of public policy, in favour of ornamental F., F. for convenience, trade F., and F. for business purposes, proceeded rather on the principle that what could be removed without material injury to the freehold was removable by the lessee or tenant in the absence of special stipulation to the contrary. Much greater indulgence, however, is and has always been extended to the case of trade than to merely ornamental F., and that greater indulgence is expressed in the orthodox rule that to take away the right to remove, the probable damage to the freehold must be so great as practically to destroy it. In the case of ornamental and domestic F., the rule appears to be that removal will only

be allowed if little or no damage be thereby caused to the freehold or to the F. itself. The common law doctrine has also been relaxed by a number of statutes in the case of agricultural F., but this was a much more belated concession to the claims of natural justice. In connection with these relaxations, it is to be noted that the above exceptions are construed more or less strictly according as the dispute is between: (a) Heirs and executors of the same owner; (b) executors of the tenant for life or tenant in tail (*see* *ENTAIL*), and the remainderman or reversioner; and (c) between landlord and tenant. The law is strictly construed in favour of the inheritance in class (a), but it is relaxed in class (b) in favour of the limited owners, while in (c) the greatest indulgence is extended to tenants.

A more detailed reference may now be made to the law of F. as between landlord and tenant. A tenant may only remove his F. during the subsistence of his term unless expressly allowed to do so subsequently. Landlords' F. include not only those put up by the landlord himself, but by any person other than the tenant, and such as have been put up but may not be removed by the tenant. It is usual, however, in leases to specify in a schedule not only the F. already on the premises or land, but such additions by the tenant as he may not remove even if he does hereafter make them. There is not a little confusion in the law as to landlords' and tenants' F. It is by no means clear what, in the absence of express stipulation, is the test of removability. As stated in the accepted text-books, the rule is that, however large the structure or thing may be, however solid or substantial, it is removable if it is so constructed as not in fact to be fastened to or let into the freehold. From one point of view this principle of the degree of physical annexation may be looked upon as no more than a test of the probable damage resulting from the removal. This reversion to the root-principle of the law of F. involves, in effect, the abandonment of all the concessions so painfully won at the expense of the freeholder. This conflict of principle, however, works less confusion than may be imagined, and for two reasons: (1) Contracts are generally so drawn as to provide for all eventualities; and (2) a great number of empirical exceptions to the ancient doctrine enable one in a moment to refer to one or other of them the great majority of chattels annexed to land or buildings; e.g. barns, mills, sheds, etc.

Erections on blocks, rollers, pattens, or plates, the whole resting upon brickwork but not united to the land or building by mortar or nails, are removable by the tenant. The decided cases also show that even if the structure is erected on a brickwork foundation let into the soil with uprights rising out of the brickwork, it is removable provided there be no actual fastening. Consistently with these decisions, stills set in brickwork have been held irremovable, but not vats merely supported by and resting on brickwork and timber. *Inter alia*, the following things of ornament or convenience are removable by the tenant: Cornices, beds fastened to the walls or ceilings, furnaces and coppers, cupboards fixed with hold-fasts, bookcases screwed to the walls, clock cases, hangings, tapestry, marble chimney-pieces, wash-tubs and fixed water-tubs, grates, stoves and ranges, ovens, pier glasses nailed to the walls, window-blinds, wainscot fixed by screws, and iron backs to chimneys. The following have been held irremovable: Verandahs the lower part of which is attached to posts embedded in the soil; conservatories erected on brick foundations affixed to or communicating with rooms in a dwelling-house; and greenhouses fixed with mortar or nailed to foundation walls of brickwork. It is to be noted, however, that some of these latter structures would be removable, despite the degree of their physical annexation, if they were erected for trade or business purposes. In regard to a tenant's trade F., the cases show that the following, *inter alia*, may be removed: salt pans, vats, chimneys, machinery, tables, steam and fire-engines. It is clear that the removal of some of these trade F. would result in not a little damage, but the difficulty in point of principle is got rid of by creating the exceptions in spite of it. In a contract between landlord and tenant it is desirable, especially from the tenant's point of view, to insert clauses in his lease expressly limiting the effect of the *pro forma* clause to 'deliver up the premises at the end of the term together with all fixtures.' The effect of a covenant (*q.v.*) to deliver up premises and all F. belonging thereto, without further explanatory words, has been construed to mean that the tenant's F. are to be delivered to the landlord as well as other F. Consequently, to guard his own interests, the tenant should always put in a proviso expressly excepting his own F. The right of a tenant to remove F. does not extend beyond the subsistence of his term, unless power be expressly given him to enter and

remove them after the expiration of the lease.

Agricultural tenants were not allowed to remove their F. until 1851, when such F. as were erected with the landlord's written consent were allowed to be removed, provided no injury were done to the freehold, and a month's notice to the landlord of intention to remove were given, and provided also the landlord did not elect to buy the F. The Agricultural Holdings Acts, 1875-83, went further and allowed removal, even though the erection was without the landlord's consent. The right of a tenant to remove agricultural F., for which he is not by statute or otherwise entitled to compensation, and which have not been erected in place of some F. belonging to the landlord or in pursuance of some obligation to the latter, is subject to these conditions: (a) Before removal all arrears of rent must be paid and all other obligations to the landlord fulfilled; (b) no avoidable damage to any other building or part of the agricultural holding must be done; (c) such damage as has been unavoidably occasioned must be made good; (d) one month's notice must be given; and (e) any dispute as to the value where the landlord elects to purchase is to be settled by arbitration. Under the Agric. Holdings Act, 1923, the tenant may, within a reasonable time after the expiration of his term, remove F. which he has erected, unless the landlord chooses to take them over at a valuation. (See LANDLORD AND TENANT.)

For a full list of chattels held to be removable by a tenant, see Woodfall on *Landlord and Tenant*. See also EXECUTOR, CONTINGENT REMAINDER, REVERSION.

Fjord, see FIORD.

Flabellifera, or Fan-bearer, the name given to a certain order of isopods. These particular isopods have tail-fans at their extremities, formed by the end-piece or telson and the last pair of appendages. Within this tribe there are many varieties or families, and one classification is into parasitic and non-parasitic F. In the former division come *Cirolana* and *Conilera*, whilst the gribble or *Limnoria lignorum* is one of the most important in the latter. See also GRIBBLE.

Flabellum, or Fan, used in the Western Church from the fourth to the fourteenth century to keep flies from the sacred vessels.

Flabellum, a genus of madreporarian coelenterates, consists of solitary corals which produce buds from their walls. The family to which they belong is the Turbinoidæ.

Flaccus, Caius Valerius (d. A.D. 88), a Roman poet, wrote *Argonautica*, a poem discovered by Poggia Bracciolini in 1416, and first printed in Bologna in 1472. F. lived in the reign of Vespasian, and was known to Martial, who urges him in one epigram to give up poetry for the more lucrative profession of law. The poem has many purple patches, but is disconnected, sometimes obscure, and not infrequently spoilt by the pedantry of the writer. It is, moreover, incomplete, eight cantos only having come down to us.

Flaccus, Lucius Valerius, a Roman warrior and statesman, was consul in 100 B.C., the remarkable Marius being his colleague. Throughout his career he allied himself with Marius and consequently assisted in the quelling of Saturninus' revolt. In 86 he was again elected consul, but his own soldiers put him to death before he could proceed against the formidable invader, Mithridates.

Flaccus, Marcus Fulvius (d. 121 B.C.), a Roman democrat, belonged to an illustrious patrician family, but identified himself with the Gracchan or popular party. On the death of Tiberius Gracchus, he was appointed one of the three commissioners to carry out the agrarian reforms. His proposal during his consulate of 125 that all allies should have the Roman citizenship led indirectly to the plebeian revolt known as the Social War. The senate, after making two unsuccessful attempts to banish him from Rome, was finally relieved of its hot-headed opponent during the riots which followed its organised opposition to Gracchus in 121. Both F. and his greater leader were slain.

Flaccus, Quintus Horatius, see HORACE.

Flacius (or Flach), Matthias (1520-75) (whose proper name was Vlacich, and who was surnamed Illyricus), a follower of Luther, led so stormy a life that the volume and merit of his literary output are truly remarkable. He studied successively in Venice, Basle, and Tübingen, and in 1541 eked out a small livelihood by teaching Greek and Hebrew in Wittenberg. Like the poet Cowper, he was the victim of spiritual depression and despair. Luther, however, drove away his melancholy and doubts and converted him into an enthusiastic Protestant reformer. The siege of Wittenberg forced him to leave the city (1547), and on his return he was soon banished once more, this time because of his vehement opposition to Melancthon, who henceforth made Wittenberg a stronghold. His enforced wanderings carried F. in turn to Magdeburg, Jena (1557-61)

Regensburg, Antwerp, Strasburg, and Frankfurt, where he died in extreme poverty. His *Magdeburg Centuries* is the first great history of Protestantism, whilst in his *Catalogus Testium Veritatis* (1556), *Clavis Scripturæ Sacræ* (1567), and *Glossa Compendiaria in Novum Testamentum* (1570) he proves himself the first exponent of scriptural hermeneutics.

Flag, a piece of cloth attached to the end of a staff, serving as a national or local emblem, or used for naval and military purposes, or for signalling. It originated from the representations of various animals and other objects that ancient nations were wont to use for similar purposes. Thus the Romans first used the Manipulus, a wisp of straw or fern attached to a pole, which served as the rallying-point of the soldiers. This was succeeded by the figure of animals, such as the eagle, wolf, horse, etc., of which the eagle alone survived until the days of the empire. The first Roman flag was apparently the Vescillum, the standard of the cavalry, a square piece of cloth attached to a cross-bar on the end of a gilt staff. The Labarum was a Roman military standard bearing at first the head of the emperor, but from Constantine's time the Greek letters XP, signifying Christ, when it was made the imperial standard. One of the earliest forms of flags was the Gonfalon or Gonfalon (from M.H. German *gund*, battle; and *fano*, flag), a square or oblong piece of cloth, sometimes with streamers, attached to a cross-bar or fixed in a frame in which it could turn. The Gonfalon of William the Conqueror bore a gold cross on a white ground with a blue bordure.

The Pennon (Lat. *penna*, a wing) was the ensign of the mediæval knight bachelor and was a tapering F. forked at the fly, exhibiting the arms or badge of its owner. The Pennoncel or Pencil was a small streamer, triangular in form, wide at the staff, and pointed at the fly, carried by the esquires and bearing the cognisance of their leaders.

The Banner was a rectangular F. borne by nobles of the rank of knight banneret and upwards, and displaying the owner's coat of arms. The standard was a large, long F. tapering towards the fly and slit at the end. It varied in size according to the owner's rank and displayed his badge. In addition, the various trades and guilds also had special Fs., which when necessary were borne to battle.

The diversity of Fs. carried in mediæval armies had necessarily to be replaced by greater uniformity

when standing armies were introduced. At first each company of the regiment had its distinctive colour, but in the reign of William and Mary the number of Fs. in the regiment was reduced to three, and later by Queen Anne to two, the royal and regimental colours, which number is still maintained. The foot guards have, however, remained unaffected by these innovations, and still retain a separate colour for each company. The regiments of household cavalry have each three regimental colours besides the Royal Standards, the dragoons have the usual two colours, while the lancers and hussars have no colours. The use of Fs. is far more extensive on sea than on land. Formerly ships sailed under the individual Fs. of their captain, or the port of origin, but now they sail under the national colours. Usually the ruler of a country has a F. personal to himself known as the Royal Standard, though it is generally rectangular like the banner. The Royal Standard of the British Isles bears the quartered arms of England and Scotland, and formerly Ireland. It is flown at the place where the king resides and on certain occasions of national celebration. The Union F. was introduced in 1606 after the union of England and Scotland, and at first bore the crosses of St. George and St. Andrew. It was ordered by James I. to be borne at the maintop of all British ships, except ships of war, which bore it upon their jack staff at the end of the bowsprit, whence it is erroneously termed Union Jack. With this F. was afterwards merged, at the union with Ireland in 1801, the cross of St. Patrick, a red saltire on a white ground, and the F. thus formed has become the national F. It is still used as the man-o'-war's jack, and is also flown at the maintruck of the admiral's vessel. It also appears on all ensigns. The ensign is the F. flown upon the ensign staff of every vessel indicating its nationality. Formerly the British red, white, and blue ensigns were distinctive of the red, white, and blue divisions of the fleet, but in 1864 these divisions were done away with and new uses allocated to the three ensigns. The White Ensign, a white F. bearing the cross of St. George and with the upper corner near the staff occupied by the union device, is the exclusive F. of the Royal Navy and the Royal Yacht Squadron and may be flown by no other vessel. The Red Ensign is a red F. with the union device in the upper quarter near the staff and is flown by British merchant vessels and ships not belonging to the navy. The Blue Ensign is a plain blue F. with the union device in the upper quarter

next the staff, and is flown by the Royal Naval Reserve and by certain yacht clubs. The Union F. and the blue ensign are also used with various additions to denote various officials or departments. Thus colonial war vessels fly the blue ensign with the colony's badge in the fly, while the F. for the colonies is the Union F. with a white escutcheon in the centre, which bears the arms of the respective colony. The F. of the Lord High Admiral is red with a golden anchor and cable, the admiral's F. a cross of St. George, red upon white ground, flown at the main-mast. The vice-admiral flies at the fore-mast a similar F., but with one red ball in the upper quarter near the staff, and the rear-admiral flies at the mizzen-mast the same F. with a red ball in each of the quarters near the staff. A commodore flies a 'broad pennant,' a swallow-tailed F. tapering towards the fly, and bearing the St. George's cross, while other officers commanding ships of war fly the long pennant, a very long, narrow, and tapering F. bearing a red cross on white ground.

The Irish Free State National F. has three stripes, green, white and orange, of equal width, the green being nearest the pole.

The Flag of the Union of S. Africa was altered from the Union Jack and defined by an Act of the Union Parliament in 1927. It is now comprised of both the Union Jack, to denote the association of the Union with the other members of the group of nations constituting the British Commonwealth of Nations, and the National F., the design of which is three horizontal stripes of equal width from top to bottom, orange, white, blue. In the centre of the white stripe the old Orange Free State F. hangs vertically, spread in full, with the Union Jack adjoining horizontally, spread in full towards the pole, and the old Transvaal Vierkleur adjoining horizontally spread in full away from the pole, equidistant from the margins of the white stripe. The Australian National F. is blue with the stars of the Southern Cross in white, and the Union F. in the top corner nearest the pole. The Canadian National F. is red with the Dominion Emblem in the centre and the Union F. in the top corner nearest the pole. The New Zealand (Merchant) F. is red with the Southern Cross Stars in white and the Union F. in the top corner nearest the staff.

The French F. is the tricolour of blue, white, and red in vertical bars adopted during the Revolution, and is used both in the navy and the mercantile marine. Before the Revolution the royal standard was a blue F. bear-

ing three *fleurs-de-lis*. During the two empires the imperial standard was the tricolour, powdered with golden bees and having the imperial eagle upon the white bar.

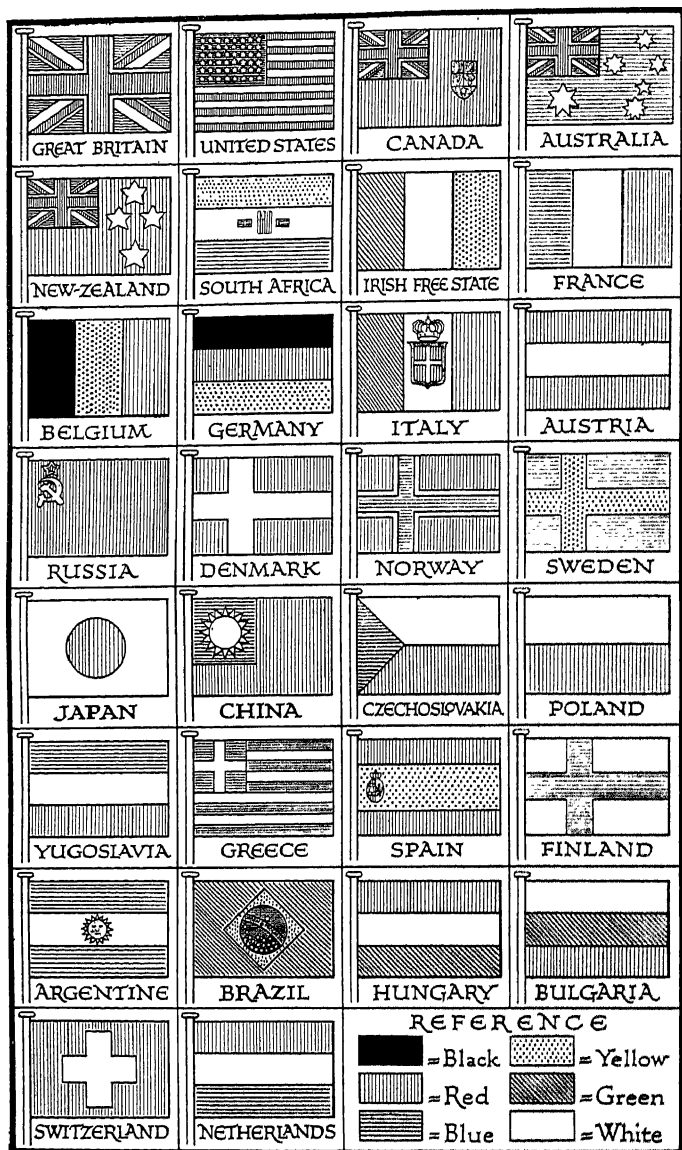
The German imperial standard had a black iron cross with broadening arms, known as the cross *patée*, upon a gold field, each quarter of which was charged with a black crown and three black eagles, while the centre of the F. bore a gold shield, surmounted by a cross and surrounded by a collar of the black eagle. Within the shield were the imperial arms. The naval F. had a white ground bearing a black, white-edged cross, in the centre of which was the Prussian eagle in black on a white circular ground. The upper canton next the staff was divided into three horizontal bars of black, white, and red, upon which rests the black, white bordered iron cross. The trade F. of Germany, three horizontal bars, black, red and gold, is now also used for national purposes.

The old Austrian imperial standard had a golden field, bearing the double-headed eagle of the empire with an indented border of gold, silver, blue, and black. The naval F. had three horizontal bars of red, white, and red, in the middle of which was a shield of the same device, bordered in gold and surmounted by a golden crown, while the mercantile service had the same F. without the shield. After the union with Hungary the combined F. of Austro-Hungary consisted of three horizontal bars of red, white and a bar divided vertically into two half bars of red and green, with two shields over the centre white bar, containing the arms of Austria and Hungary respectively.

The old Russian imperial standard was yellow, bearing the arms of the empire, and the Naval F. was simply a blue diagonal cross, or saltire, on a white ground.

After the Great War the Austrian F. design was changed to three horizontal bars of red, white, and red. The Hungarian flag now has three horizontal bars, red, white and green, with the Hungarian arms, without supporters, in the centre. The Russian or Soviet F. is red with a yellow sickle crossing a yellow hammer and a star.

The Italian royal standard is a white F. with blue border, bearing the arms of the King of Italy. The naval F. has three vertical bars of green, white, and red, and the central bar bearing the arms of Savoy, a red, blue-bordered shield, with white cross and surmounted by a crown. The mercantile flag is identical, save that it has no crown.



The old Spanish standard bore the royal arms and the naval F. had red, yellow, and red horizontal bars, the middle bar bearing, near the staff, a circular shield with the arms of Leon and Castile surmounted by a crown. The mercantile F. is yellow with two narrow horizontal red bars. It remains to be seen what the Spanish Republic will adopt for its various flags.

The Portuguese F. (since 1910) is of dark green (next pole) and bright red in the proportion of five green to eight of red. The proportion of length to width is $1\frac{1}{2}$ and 1. On the red and green ground, half in each, is a shield, and on it representations of spheres and castles.

The Norwegian F. is red, with a blue cross bordered with white, the Swedish F. is blue, with a yellow cross. Both Fs. are square for mercantile vessels, but swallow-tailed for standard and navy, with the arm of the cross projecting between the tails and pointed.

The Belgian naval and mercantile F. has three vertical bars, black, yellow, and red. The standard is the same, with the royal arms in the centre.

The Dutch naval and mercantile F. has three vertical bars, red, white, and blue. The standard is the same, with the royal arms in the centre.

The Danish F. is red, with a white cross, swallow-tailed for the navy, and rectangular for the mercantile service. The standard bears a square in the middle with the royal arms.

The Turkish naval F. is red with a white crescent and an eight-pointed star near the staff. The mercantile F. is green with a white crescent upon a red circle in the centre.

The Greek standard has nine horizontal blue and white stripes, while the upper quarter near the staff is blue, with a white cross, in the centre of which is a crown. The mercantile F. is identical without the crown.

The Rumanian flag has three vertical bars of blue, yellow, and red. The Bulgarian three horizontal bars of white, green, and red, the Servian three horizontal bars of red, blue, and white.

The United States flag consists of thirteen red and white stripes, representing the original number of states, with the upper inner quarter blue, bearing one star for every state actually in the union. The number of stars is now 48. Two stars were added in 1912 for Arizona and New Mexico.

The Mexican F. is a tricolour with green, white, and red vertical bars, bearing the Mexican arms in the central bar.

The Brazilian F. is a green F. bearing a yellow rhombus. In the rhombus is a blue circle dotted with stars and bearing the motto 'Ordem e progresso.'

The Argentine F. has three horizontal bars, blue, white, and blue, for the mercantile service, and a sun upon the white bar for the navy.

The Chilean F. consists of two horizontal halves, white and red. Near the staff in the upper bar is a five-pointed white star on a blue ground. The Japanese F. is a red central disc, representing the sun, with red spreading rays on a white ground. The Chinese F. (since 1912) is a five equal-striped one with the following colours: red, yellow, blue, black, and white, representing China proper, Manchuria, Mongolia, Chinese Turkestan, and Tibet.

Other Fs. are: Finnish (Merchant), white with blue horizontal cross extending to the width and length of the F. Polish (Merchant) consists of two horizontal stripes, white and red, of equal width with the white uppermost and an eagle in a crest in the centre of the white. Swiss, red with white cross in centre. Persian (Man of War), three horizontal stripes, green, white, and brown at bottom with lion in centre of white. Yugoslavian National, three horizontal stripes of equal width, blue, white and red with blue uppermost. Estonian National, three horizontal stripes of equal width, blue, black, and white with the blue uppermost. Lithuanian National, three horizontal stripes of equal width, orange, green, and red, with the orange uppermost. Bulgarian, three horizontal stripes of equal width, white, green, and red, with the white uppermost. Cuban National, oblong with red triangle next to staff extending one third of flag, containing a five-pointed star in centre, the rest of the design being five horizontal stripes of equal width, blue and white alternately with blue uppermost. Latvian (National merchant), three horizontal stripes of equal width, reddish brown, white, and reddish brown, with white in the centre. Siamese, five horizontal stripes, red, white, blue, white and red, of equal width, with an elephant as centre emblem. Czechoslovakian National, a blue triangle within the square extending from the pole with an apex in the centre of the F. the top portion of which is white and the remainder red.

A white F. is the F. of truce, a yellow F. denotes quarantine, a red F. mutiny, and a black F. piracy. For the use of Fs. for signalling see SIGNALLING.

Flag, in botany, the popular name

of two species of Iridaceæ found in Great Britain. *Iris pseudacorus*, the yellow or water F., grows in marshes and ditches. *I. foetidissima*, the fetid Iris, grows in hedges and is of a leaden-blue colour. This name is also given to the tall blue Irises of the United States, *I. versicolor*, *I. prismatica*, etc.; and with a qualifying adjective to several other similar plants, *Gladiolus segetum*, the corn F., *Acorus calamus*, the sweet F., etc.

Flag-captain, the captain of the admiral's ship in any squadron or detachment of the navy and is commonly the admiral's nominee.

Flagellants, **The**, is the name given to groups of religious fanatics who between the thirteenth and fifteenth centuries urged and exaggerated the efficacy of self-inflicted scourging by way of atonement for sin. This doctrine had been moderately put forward by many ascetics when suddenly in 1260 there sprang into public notice a certain monk of Perugia, Ranieri by name, who by his feverish enthusiasm prevailed on numbers of men and women to band themselves together and to march from village to village, singing violently denunciatory hymns and halting at every square or cross-ways to flagellate themselves, so as often to draw blood and cause grave bodily hurt with a heavy knotted scourge, not infrequently loaded with iron or lead. Condemned in 1261 by the Pope, this group died out, but later flagellation visited Europe in waves, usually after some great upheaval or crisis. Thus the outburst of 1260 was the result of the chaos produced in Italy by the unceasing struggles between Guelph and Ghibelline, whilst that of 1349 was directly traceable to the panic and despair which took hold of men's minds after the Black Death. The F. wrought themselves up to such a pitch of frenzy and fanaticism that they persuaded themselves that the blood they drew by their scourges would make efficient atonement for their sins. To such a degree did they magnify the virtue of their extravagant acts that they dispensed alike with the church sacraments and the ministrations of the clergy. The last formidable wave was that of 1414 which subsided in the burning of the leader, Conrad Schmidt, and in the punishment of his followers by the intimidating inquisition.

Flageolet, a musical instrument resembling a small hautboy, but blown through a small ivory tube; the tone is sweet, though weak and fluty. It is said to have been invented in 1581, and is usually made of box or some similar hard wood. Its compass is two octaves; it is often used as a substi-

tute for the flute. The F. is also an organ stop of 2 ft. scale, and wood pipes. F. tones are produced upon instruments of the violin type by drawing the bow very lightly over the strings.

Flag-lieutenant, a naval officer who transmits by signal or word of mouth the admiral's commands to the various ships. He is attached to his admiral exactly as in the army the aide-de-camp is to his general.

Flag-officer ranks above a captain in the British navy and is usually a rear-admiral, vice-admiral, or admiral. He is so called because he is privileged to hoist a flag at his mast-head instead of a pennon, the flag being invariably a red St. George's cross on a white ground. A rear-admiral carries it at the mizzen, a vice-admiral at the fore, and an admiral at the main. To F's. are given the commands of naval stations at home, and of fleets at home or abroad, whilst they may be entrusted with the surveillance of any important dockyard. They are appointed by the admiralty at the king's pleasure.

Flagship, so-called because it flies the admiral's colours. In any naval engagement other members of the squadron naturally look to the F. for orders.

Flag-signalling, or **Flagging**, see **SIGNALLING** and **SEMAPHORE**.

Flagstaff, a pole or staff upon which a flag is hung; a F. on land is more often a tall mast, permanently fixed, while that on board ship is generally the masthead, or at the stern.

Flagstaff, a tn. of Arizona, U.S.A., the cap. of Coconino co., situated 84 m. E. of Prescott Junction. Large stock raising district. There are lumber mills, excellent yellow pine being produced. In the city are the Lowell observatory and the headquarters of the Coconino forestry service. Pop. 3891.

Flahaut de la Billarderie, **Auguste Charles Joseph**, Comte de (1785-1870), a Fr. general and diplomatist, the son of Mme. de Souza, and took the name of her first husband, Flahaut de la Billarderie, who was executed in the Reign of Terror (1793), although it is generally believed that Talleyrand was his father. From 1800 till Waterloo, he was continually in active service, fighting at Landbach (1805), Friedland and Leipzig (1813), having served with distinction in the Russian campaign (1812). His liaison with Hortense de Beauharnais, Queen of Holland, was the result of a devoted attachment. Having taken part in an unsuccessful attempt to put Napoleon II. on the throne, he finally retired to England, where he married

a Scottish peeress, who eventually became Baroness Keith.

Flail, a farm-hand implement, formerly used for threshing corn, consisting of a thick club attached by a rope or leather thong in such a way as to enable it to swing freely.

Flambard, Ranulf (Ralph) (d. 1128), a chief justiciar in the reign of William Rufus; was a Norman of obscure birth, who began life by being at the same time priest and lawyer. After Lanfranc's death, in 1089, he insinuated himself into his place as the king's chief adviser, and soon made himself odious to clergy and laity alike by his infamous, though ingenious, devices for enriching his master's exchequer. A favourite means was arbitrarily to keep a see vacant that the king might pocket the revenues. In 1099 he became bishop of Durham, but when Henry I. came to the throne he was imprisoned in the Tower. Having made good his escape, he took part in Robert's rebellion of 1101. Notwithstanding this treachery, he regained his bishopric and was honoured as a founder of the cathedral.



FLAMBOROUGH HEAD

Flamborough Head (A.-S. Flæm-burg), a headland on the coast of Yorkshire, England, situated 2 m. E. of Flamborough. It is composed of limestone cliffs, and extends a considerable distance into the sea, rising in places to a height of 400 ft. Formerly beacons were lighted on the summit, and now a lighthouse, the

light of which is visible at a distance of 25 m., stands 214 ft. above high-water mark.

Flamboyant, the adjective used to describe the last phase of Gothic architecture in France during the fifteenth and sixteenth centuries. It corresponds to the Perpendicular style in England, and the name refers to the flame-like curves and flowing lines which characterise the window tracery of the period. Generally speaking, F. work is finicky and beautiful in detail rather than in the whole effect, and is related to the finest Gothic architecture, just as later Greek statuary is to the masterpieces of Pheidias. Broad surfaces are left bare, minute ornamentation being crowded into insignificant corners and spaces. 'Interpenetration,' that is, the interlacing of base mouldings, is an ingenious and intricate rather than a beautiful feature of this style.

Flame (Lat. *flamma*, from root, *flag*; cf. *flagrare* and *φλέγειν*) can be defined as a gas which is temporarily luminous as a consequence of chemical action. The common distinction which is drawn between luminous and non-luminous Fs. is not scientific, and can only be taken as representing a rough estimate of the degree of luminosity. Fs. can also be induced by the medium of electricity; rapidly alternating high-tension discharges in air will produce an oxygen-nitrogen flame, which cannot be distinguished from a flame produced by ordinary means.

Structure of flames.—The term 'structure,' as applied to Fs., is somewhat vague, and different accounts are given as to the number of differentiated parts in various Fs. The shape of Fs. as a rule is that of a hollow cone. The gas which is unburnt forms the interior of the cone and the other gas surrounds it in the cases of Fs. produced simply by the union of two gases. The Fs. of the compounds of carbon, and especially of hydrocarbon, have received more attention and been more studied than other kinds, as is natural, owing to their extensive use and application. The cone of F. is simple when such gases as oxygen and hydrogen only unite, but consists of two or more parts in more compound cases. At the base of a candle F. is a blue portion which forms the rudiment of an inner cone of combustion. When no air is mixed with the gas before coming out of the burner, no clear differentiation of the structure can be observed in a carbon-monoxide F. Hydrogen, when burnt in air, has very little luminosity or colour. The F. of cyanogen is peculiar in structure,

consisting of a shell, almost crimson in colour, surrounded by a margin of bright blue. These two colours mark two stages in the process of combustion, as the carbon of the gas is oxidised first to carbon monoxide and then to carbon dioxide. If the gas of a hydrocarbon compound is supplied with sufficient air before leaving the burner, as in the case of the blast blow-pipe, the result is a sheet of undifferentiated F., blue in colour.

Luminosity of flames is caused by various reasons, of which the presence of solid incandescent matter in the F. is one. In some cases the solid is put into non-luminous F. which it renders luminous, as in the case of the incandescent gas lamp and the lime-light. In the candle, oil, and gas Fs., small particles of carbon, set free by the decomposition of the hydrocarbons, form the chief cause of luminosity. In many Fs., however, solids are absent and the luminosity is still great. Such are the Fs. of oxygen and hydrogen under pressure, carbon disulphide, nitric oxide, etc. With an ordinary hydrogen F., luminosity is diminished as the purity of the hydrogen is increased and as the air is freed from dust. High temperature may increase the luminosity of Fs., in which are no solids, as in the case of coal-gas in a regenerative burner, or the same result may be obtained by increasing the density of the F. gases by pressure, as in the case of a hydrogen and oxygen F. The bunsen burner is an illustration of the converse of the above process. Combustion in this case is rendered more complete by the addition of air to the inside of the F., but the pressure is reduced by the consequent admixture of nitrogen and oxygen, and the luminosity is thus lessened. So in the case of an ordinary gas F., if instead of air, nitrogen or carbon dioxide is admitted to the interior of the flame, the latter can be rendered practically non-luminous. The chemical energy required for the production of F. may be liberated in the process of either decomposition or combination of the component gases; the latter is the more usual, but gun-cotton is an instance of the former, as it gives off a F. in the process of decomposition.

Flame-Flower, the popular name of the various species of *Kniphofia*, a genus of Liliaceæ. They are hardy plants, suitable for cultivation in a light soil, and bear vivid scarlet flowers. Originally it came from S. and E. Africa.

Flamen (from Lat. *flare*, to blow up the altar fire), in ancient Rome the title of sacrificial priests. The chief or 'maiores' were the 'F. Dialis'

(priest of Jupiter), 'F. Martialis,' and 'F. Quirinalis,' who were always patricians, whilst the other twelve were chosen from the plebeians and were consequently known as 'minores.' Their supreme function was daily sacrifice, and on Oct. 1 the maiores invariably offered oblations on the Capitol to 'Fides Publica.' A woollen mantle, called the 'læna,' a white conical hat, the 'apex,' and a laurel wreath or olive branch were their distinctive dress. Like the pope the 'F. Dialis' was hedged round by many restrictions; for example, he might never leave the city for a night or look at an army, nor mount a horse. His wife, known as the 'flaminica Dialis,' helped him to dispense his religious duties.

Flamingo (from Lat. *flamma*, flame), the name given to a genus of beautiful birds belonging to the family Phœnicopteridæ, of the order Odontoglossi. They inhabit most of the



SCARLET FLAMINGO

countries bordering on the Mediterranean, a few individuals occasionally travelling as far as the British Isles and N. Germany. By its long neck and legs, as well as by its internal anatomy, the F. gives evidence of an ancestral connection with the storks. There are nine existing species of the *Phœnicopterus*, and these constitute the true Fs. *Ph. roseus*, the European F., has plumage of a pinkish-white, with scarlet wing coverts; the beak is rosy-red at the base and black at the tip; and the legs and feet are

light vermillion. *Ph. ruber*, the American F., has an entire plumage of vermillion. Large flights of these birds, travelling, as they do, over the lakes, present a most beautiful spectacle. The F., though essentially a wader, is also a powerful swimmer. It feeds on small aquatic animals and water-plants.

Flaminian Way, or *Via Flaminia*, was the great trunk road which in Roman times led for 222 m. northward from the metropolis to Ariminum on the Adriatic. Literature is full of allusion to it, which is not surprising, as it was a famous thoroughfare alike for travel as for commerce. A wayfarer leaving Rome would pass in turn through Olricoli, Narnia, Sangermini, Carsulae, Mevania, and Forum Flaminii. In time he would reach Nuceria and after ascending the pass over the Apennines would descend to Cales. Here his road bore round in a north-easterly direction, and he would finally reach Forum Fortunæ on the coast, whence he would turn north-westward through Pisaurum on to the busy port of Ariminum. Some of the paving stone and the bridges or, at least, their piers still remain *in situ*. It was built during the censorship of Flaminius (220 B.C.), whence the name.

Flamininus, Titus Quinctius (c. 228–174 B.C.), a Roman statesman and general, secured the faithful support of the Greeks against Philip V. of Macedon, from whose oppressive yoke he rescued them, his victory at Cynoscephalæ in 197 being the decisive engagement. His somewhat hollow gift of independence and liberty to his allies gained him the title of ‘deliverer and father of Greece.’

Flaminius, Caius, a Roman democratic leader and general, granted during his tribunate of 232 B.C. a stretch of newly acquired land, ‘ager Gallicus Picenus,’ to the plebeians in direct opposition to the senators’ wishes, and later built for them the Circus Flaminius on the Campus Martius. In 223 he gained a notable victory over the Insubres on the banks of the Addua, but in 217 he was slain during the Punic wars in the battle of Trasimene Lake into which he had foolishly allowed the astute Hannibal to entrap him. See also **FLAMINIAN WAY**.

Flammarion, Camille (1842–1925), a French astronomer, was entered in 1858 at the Paris Observatory as an astronomical student and worked for four years in the ‘Bureau des longitudes,’ where he assisted in the compilation of a scientific *Nautical Almanack*. For some time he edited the scientific columns of the *Siècle*, and soon became known as a popular

lecturer on astronomy. In 1868 he made several ascents in a balloon in order to investigate aerial currents and the hygrometry of the atmosphere. Two years later he published an important work on the movements of celestial bodies, and in 1880 was awarded the ‘Montyon’ prize of the French Academy for his *Astronomie populaire*. One of his most important discoveries is that the rotatory movements of the planets are governed by the effect of gravity upon their various densities. *Les Merveilles célestes* (1865), *Voyages aériens* (1868), *Dans l’infini* (1872), *Atlas céleste* (1877), and *Les Comètes, les Étoiles et les Planètes* (1886) are a few of his many publications. Towards the end of his life he became much interested in the question of immortality and published several curious books dealing with it.

Flamsteed, John (1646–1719), first astronomer royal of England, showed a lively interest in the heavens whilst still a boy, and was delighted to find himself installed in 1676 in the royal observatory at Greenwich, then just completed. At first he was harassed by lack of funds, and gladly supplemented his £100 a year by teaching and by taking holy orders, which enabled him to obtain a small living in Surrey. The three volumes of his *Historia celestis Britannica*, which did not appear till 1725, contained a record of all his astronomical observations and also the *British Catalogue* of nearly 3000 stars. Unfortunately bickerings with Sir Isaac Newton, who depended on F. for data in support of his lunar theory, cast a heavy shadow over the worthy astronomer’s later years.

Flanders (Flem. *Vlaenderen*, Ger. *Flandern*), the former name of a country of Europe, which in the seventh century was applied only to Bruges, but it later extended along the North Sea from the Scheldt to the Straits of Dover and Calais. It comprised the present Belgium, with a southern portion of the Netherlands, and a northern portion of France.

History.—The country was originally inhabited by Celtic tribes, the Morini and Atrebatæ, who were subjugated by Cæsar’s forces, and the land became incorporated with Roman Gaul. In the early centuries A.D., F. was overrun by invaders, many of the Franks taking up their abode permanently. By the Treaty of Verdun in 843, F. was assigned to Neustria, or W. Francia, under Charles the Bald. F., though virtually a suzerainty of France, was politically autonomous, being governed by the Counts of F. The first count whose name is recorded in history is Baldwin

I., *Bras-de-fer* (837-877), the son-in-law of Charles the Bald. The early counts were very much occupied in guarding their lands from the attacks of predatory Northmen, and in extending their own dominions. Baldwin III. (d. 961) laid the foundations of F.'s future commercial and industrial prosperity by establishing the first weavers and fullers at Ghent, and by patronising the annual fairs in the chief Flemish cities. Baldwin IV. (989-1036) obtained Valenciennes in 1006 from Emperor Henry II., thus becoming a feudatory of the empire as well as of the French crown. During the rule of Baldwin V. (1036-67), the co. of Alost (Aalst), Tournai and Hainault were added to the principality. The counts of the tenth and eleventh centuries were zealous in promoting the industrial interests of the country. Count Philip (d. 1191) encouraged the development of the 'free towns,' and conferred certain municipal privileges on a number of seaports. On his death the countships of F. and Hainault, which had been separated during the rule of Baldwin VI., were now reunited. Baldwin IX. (1194-1206), the founder of the Latin empire of Constantinople, was succeeded by his two daughters, Johanna and Margaret. It was during this reign that France began to exercise undue influence in the country, and attempted to deprive the people of many of their rights. Philip the Fair invaded the country during the reign of Guy of Dampierre, Margaret's son Guy and his nobles were taken prisoners, and F. established as a French dependency. The sturdy Flemish burghers rose in insurrection, and under the leadership of Peter de Conynck, a master cloth-weaver of Bruges, routed the French army at Courtrai (1302). The cities increased in power and wealth, and many of them were governed locally on democratic principles. The internal struggle for superiority between the chief cities often disturbed the country with civil war. In the middle of the fourteenth century Jacob van Artevelde was the virtual ruler of F., and persuaded his countrymen to make an alliance with Edward III. of England in defiance of their count. Jacob fell in the battle of Crécy, but Philip van Artevelde for a time maintained the independence of his country, until he too was slain at Roosebeck (1382). By the marriage in 1369 of Margaret, the heiress to the countship, and of Philip the Bold, of Burgundy, the history of F. became intimately connected with that of Burgundy, until in 1477, F. became part of the Austrian Nether-

lands. The Flemish communes still attempted to assert their rights in defiance of their rulers, but the Burgundian dukes, while promoting Flemish industry and trade, sternly repressed any revolts against their authority. In 1526 France was obliged to yield her right of suzerainty in favour of Austria, and in 1633 F. reverted to Spanish rule. From 1659 to 1713, by the treaties of the Pyrenees (1659), Aix-la-Chapelle (1668), Nimeguen (1678) and Utrecht (1713), southern portions of the country were assigned to France, under the name of French F. By the Treaty of Vienna in 1815 it was incorporated in the Netherlands. In 1831 the new kingdom of Belgium was formed, and the old name of F. was retained in the two provinces East and West F.

East F. lies to the N.W. of Belgium, extending to the neighbourhood of Antwerp. It has rich and fertile soil, being well watered by the Scheldt and the Lys. The chief towns are Ghent (the capital), Nicolas, Eccloo, and Oudenarde. The province is famous for its flax, and the inhabitants manufacture cloth, paper, leather, etc., and are occupied in cattle breeding. Area 1158 sq. m. Pop. (1925) 1,119,591.

West F. borders the North Sea for about 40 m. Like its neighbouring province, the country is flat and the soil very productive. Agriculture is the chief occupation of the inhabitants. Flax, hops, and tobacco are cultivated; market-gardening is carried on under excellent conditions, and butter and other dairy produce are exported. The population is also engaged in fishing and in weaving, spinning, lace-making, bleaching, etc. The chief towns are Bruges (q.v.) (the capital), Ostend (q.v.), Ypres (q.v.), and Courtrai. Area 1263 sq. m. Pop. (1925) 865,000.

Flemish Language and Literature. Flemish belongs to the Teutonic group of the Indo-Germanic or Indo-European family. It is thus closely connected with Ger. and with Eng., all having grown out of the same Teutonic stock. There is very little documentary evidence of Old Netherlandish apart from an interesting translation of the Psalms. The literature of Middle Netherlandish, which developed about the eleventh or twelfth century, is particularly rich in romances and fables, among the former being *Lancelot* and *Floris en Blancefloer*, and chief among the latter *Reinaert*. Now Netherlandish, or Dutch, dates from the early fifteenth century. The love of literature and pride in the national tongue were promoted by the formation of

Kamers or literary clubs, the most famous being *In Liefde Bloeiende* at Amsterdam. The seventeenth century was the most fertile period of Flemish literature. But at the beginning of the nineteenth century, after the separation of Belgium from the Netherlands, there was a great revival of letters. The Flemish language had been largely superseded by Fr., and was regarded almost as a patois. The pioneer of the new movement was Willems (1793-1846), who aroused interest in Flemish literature by editing the old classics, and by founding in 1834 a literary organ for Flemish writers, *Nederdiutsche letteroefeningen*. Among the new novelists was Hendrik Conscience, who made his reputation by his pictures of contemporary Flemish life. Among the poets of the new school should be noted Ledeganck, Van Beers, Ter Haar, Ten Kate, Koninck, and Dautzenberg, and among the novelists are numbered Van Lennep, Renier and August Snieders, and Virginie Loveling. Consult Schneider, *Geschichte der Nederl. Literatur* (Leipzig), 1888; Stechor, *Histoire de la Littérature néerlandaise en Belgique*, 1886; and Paul Hamelius, *Histoire politique et littéraire du Mouvement flamane*, 1894.

See also BELGIUM; FLEMINGS IN ENGLAND; and for the Great War campaigns see FRANCE AND FLANDERS, GREAT WAR CAMPAIGN IN.

Flandrin, Jean Hippolyte (1809-64), a French historical and portrait painter. His fame rests chiefly on his monumental decorative work, of which the church of St. Germain-des-Près offers fine illustration. For here hung in the sanctuary his great frescoes, 'Christ entering Jerusalem' and 'Christ going up to Calvary' (1842-44), and in the choir his figures of many saints and virtues (1846-48). The Cathedral of Nantes possesses his 'St. Clair healing the Blind,' and his pictures may also be seen in the churches of St. Paul at Nismes, St. Vincent de Paul at Paris, and St. Martin d'Ainay at Lyons.

Flange, a projecting rim or edge, used in engineering, machinery, building, etc., either to strengthen an object, or to afford means of fixing it to another object, or to serve as a means of guidance. The variety of Fs. is too great to be fully detailed here. A girder consists of a vortical 'web' connecting horizontal parts called the Fs., which are necessary to its strength, and iron joists are a similar combination of web and Fs. The use of a F. for jointing purposes is seen in cast-iron pipes, the ends of which are joined by bolts passing

through the F., while iron plates are also made with F. at all four sides to enable them to be bolted together. Such plates are used in the construction of the tubular tunnels for underground railways, the F. serving as ribs and strengthening the structure. The most frequent use of the F. for guiding purposes is to be seen in the tires of tramcar or railway carriage wheels, where the Fs. prevent the vehicle from leaving the rail. A back F. is the plate placed over the end of a cylinder in order partly to close the aperture.

Flannan Islands, or Seven Hunters, an uninhabited island group of Scotland, par. of Uig, Ross-shire, situated 20 m. N.W. of Gallion Head, and consists of seven islands and twenty rocks, the highest point reaching 282 ft. The group contains some interesting Caledonian ruins, which are estimated as dating from the early eighth century. Cragmen frequent the islands in June to obtain the eggs of the eider ducks, gannets, and other sea fowl, which breed there.

Flannel, a soft woollen textile, made usually from loosely spun yarn. The origin of the word is probably Welsh, as F. made from the short staple wool of the mountain sheep was a well-known production in Wales early in the sixteenth century. A material known as 'baize,' which is a sort of coarse F., was introduced into England by the French refugees about the middle of the sixteenth century. In Rochdale, which is the historic seat of the industry, the manufacturers favoured a wool of fine texture from the Southdown sheep, and also the wool from a Norfolk breed. In Ireland the wool from the Wicklow variety of the Cottagh breed is used. F. is now made largely from Australian, New Zealand, and S. American wools. The manufacture of F. in Rochdale alone employs over 2000 people, and a considerable export trade (5,500,000 yds. in 1927), is carried on by Great Britain. The increase of flannelettes on the markets has undoubtedly checked the progress of the F. trade, but the Merchandise Marks Act has done much to ensure for purchasers the genuineness of the article.

Flash Point, the temperature at which an oil will give off a vapour which can be ignited. This temperature varies with the pressure on the surface of the oil, and is higher when the oil is heated in an open apparatus than when a closed one is used. To obtain an exact ratio a standard apparatus must be used. In England the one used is Abel's closed oil tester. It consists of a closed receptacle surrounded by a water jacket. The tem-

perature is taken by means of a thermometer in the water. The oil receptacle is fitted with a sliding lid. From time to time this is slipped back and a light applied to the opening. The lowest temperature at which a flame appears is taken as the F. P. of the particular oil that is being tested. In most countries there are special regulations with regard to the storage of oils with low F. Ps. In England the minimum legal F. P. (determined in a closed apparatus) is 73° F.

Flat (Old Eng. *flet*, level), applied in modern language to the story or floor of a building, fitted up as a self-contained residence, several of such dwellings being approached by a common staircase. The term 'flatted house' is still used in Scots law. This tenement system is more common in Scotland and on the Continent than in England, but of late years it has been widely adopted in large towns of this country, especially in congested districts.

Flat (b), a character in musical notation which indicates that a note is to be sung or played a semitone lower than is its natural pitch. The F. signature always occurs before the note to be flattened, in the case of an accidental, i.e. where the F. comes in temporarily in the course of a piece of music, and the effect does not extend farther than the bar in which the F. is put. A double F. (bb) is a sign placed before a natural note, to show that the pitch is to be lowered by two semitones.

Flatbush, formerly a township of Long Is., near Prospect Park, Brooklyn. It has a lunatic asylum, and is now part of the borough of Brooklyn.

Flateljarkbok, or the *Book of Flatelj*, a collection of Icelandic legends and true stories, which was compiled in the fourteenth century, and which deals chiefly with the tenth and eleventh centuries A.D. One story tells how certain Norsemen actually reached America some four centuries before Columbus. The MS. is now preserved in Copenhagen.

Flat-fish. The family Pleuronectidae, to which all F. belong, is distinguished by the unsymmetrical conformation of the head and anterior region of the body, in consequence of which both eyes are situated on the same side, in some cases the right and in others the left. The body is greatly compressed and flattened, the side on which the eyes are situated being, as a rule, dark, and the under or eyeless side being colourless. Young F., which are met with in the open sea, are transparent and perfectly symmetrical, having one eye on each side of the head, and it is evident from individual metamorphosis that the

order was originally normal in shape, though there is some difference of opinion as to the process of their evolution. The F. is exclusively carnivorous, and inhabits all seas except those of polar regions or off rocky coasts. Many species, such as flounders, ascend rivers, and some have become inured to a fresh-water existence. The pigment-bearing elements in the coloration of the dark side of the skin are known as chromatophores. When lying on the sandy bottom of the sea, which it chooses in preference to a muddy bed, the F. is hardly to be distinguished from its surroundings, as the bright spots on the skin harmonise exactly with the sand and pebbles. The least specialised genus is *Psettodes erumei*, which ranges from the Red Sea through the Indian Ocean to China, and is also found on the W. coast of Africa; it has the dorsal fin commencing at the nape of the neck, whereas in all others it commences above or in front of the eyes. *Hippoglossus vulgaris*, the halibut, has both eyes on the right side. The genus typified by *Rhombus maximus*, the turbot, contains also *Rh. aquosus*, the brill. *Pleuronectes platessa*, the plaice, and *Pl. flesus*, the flounder, are characterised by the narrow mouth aperture. Another group includes *Solea vulgaris*, the common sole; *S. aurantiaca*, the lemon sole; *S. variegata*, the banded sole; *S. minuta*, the dwarf sole, and other allied species.

Flat-foot, an acquired deformity of the foot in which both arches of the foot are impaired, more especially the lateral arch. It is caused generally by long periods of standing, and is therefore commonly seen in policemen, domestic servants, hospital nurses, etc. The tendency to F. is increased by any constitutional weakness, by lack of proper food, and by general debility. It is especially liable to occur after Potts' fracture of the ankle. In its earlier stages the condition is accompanied by pain along the upper and outer part of the foot.

Treatment.—It is important that the condition should be treated early. Excellent results may then be obtained by rest, massage, and suitable exercises. The most useful exercises are: standing and walking on tiptoe, rising on tiptoe and falling back on the heels; balancing on the outer edge of the feet; and walking on the outer edge of the feet. Many patent supports are made for this condition, and are very generally used. They are not to be recommended, as they tend to stretch further the tendons and ligaments of the sole of the foot which are already

lax, and so, too, increase the F. High heels should be especially avoided. In the later stages of F., attempts have been made to improve the condition by setting the foot in the correct position in plaster of Paris splints. Some surgeons operate for the condition, removing a wedge of bone from the inner side of the foot. If, however, the condition has been allowed to go far, it becomes extremely intractable, and the results of operation are often disappointing.

Flatheads, the name given to a tribe of N. American Salish Indians, who formerly occupied the country round the mountains of north-western Montana, between the Cascade range and the Rocky Mts. The name F. owes its origin to an ancient custom, once prevalent among Peruvian tribes, of flattening the skulls of children during infancy. The term is incorrectly applied to the Salishes, but the practice still continues among modern Chinooks and among other Indian tribes dwelling by the Pacific coast of N. America. The F. used formerly to offer human sacrifices to the sun. In 1841 Father P. J. de Smet founded among them a very successful mission, and they have developed into able and industrious farmers. They are brave fighters, but prefer peace, and have always maintained friendly relations with white races. They now dwell in reservations in British Columbia and Washington, and their number is estimated at about 17,500.

Flatman, Thomas (1637-88), a poet and miniature painter, was educated at Winchester and New College, Oxford, being a fellow of the latter in 1676. He painted excellent miniatures and wrote much poetry. Granger says: 'One of his heads is worth a ream of his Pindarics.'

Flattery, Cape, a headland of Washington state, U.S.A., washed on the N.E. by the strait of Juan de Fuca, and on the S.W. by the Pacific.

Flatulence, a condition characterised by the presence of gas (*flatus*) in the stomach or intestines. It is usually accompanied by a feeling of oppression, and the accumulation can often be felt as an elastic swelling which has in some cases given rise to suspicion of a tumour. The commonest cause of F. is digestive trouble. In normal digestion the food-material is broken up by the enzymes elaborated by the body itself, and the liquid products find their way into various channels for the nutriment of the body. Digestion may be accompanied by bacterial action which, to a certain extent, aids the activity of the digestive ferments. Bacterial fermentation is, however,

accompanied by evolution of gaseous products, which exert pressure upon the walls of the alimentary tract and give rise to the symptoms of F. The condition may also be caused by chemical action between food material occasioning effervescence, or, as is often the case with infants, an accumulation of air ingurgitated with the food. In hysterical patients F. is often caused by evolution of carbon dioxide from the blood. The treatment depends mainly upon the cause. Infants suffering from 'wind' are usually eased by the administration of dill-water, prepared from the aromatic fruit of *Peucedanum graveolens*. The great absorbent properties of charcoal are utilised in preparations known as charcoal biscuits. Massage of the abdominal regions is often helpful. Among carminatives may be mentioned cloves, chillies, or cayenne pepper, ginger, peppermint, aniseed, etc. Where the F. is intestinal and obstinate, an enema of asafetida usually has a good effect.

Flat Worms, see PLATYHELMINTHES

Flaubert, Gustave (1821-80), a French novelist, b. at Rouen. He was the son of a surgeon, and did not leave his native place till 1840, when he went up to Paris to study law. His mother having been left alone through the death of his father and sister, he abandoned the idea of a legal pro-



GUSTAVE FLAUBERT

fession and made a home for her at Croisset, on the Seine, not far from Rouen, where he lived till his death. At this time he became an intimate friend of M. Maxime du Camp, with whom he travelled in Brittany in 1847, and Greece and Asia Minor from 1849-51. From 1846 to 1854 he had an *affaire du cœur* with Mlle. Louise Colet, apparently the only one of his life. He never married.

He began to write about 1846 and started with poetry, which he soon

abandoned for prose. On his return from Greece he set to work on his great novel, *Madame Bovary*, which took many years to prepare, and finally appeared in serial form in the *Revue de Paris*, 1857. It is the story of a girl of culture and high aspirations, married to a well-meaning but stupid doctor. Her various lapses into vice and her ultimate suicide are related with startling vividness. The publication caused a great deal of scandal, and the author and publisher were prosecuted on a charge of violating morals, but were acquitted. In the following year F. paid a visit to Carthage and began a serious, archaeological, and historical study of its surroundings, which he made use of in his second work, *Salammô*, which was finished in 1862, a romance of the struggle between Rome and Carthage.

In 1866 he was decorated with the Legion of Honour. Three years later he published a realistic novel of contemporary manners of the type of *Madame Bovary*, called *L'Éducation Sentimentale*. It was followed in 1874 by *La Tentation de Sainte-Antoine*, a historical romance, worked up from fragments which he had written as early as 1857. He was now a distinguished member of a small literary set, which included Tourgenieff, Zola, Daudet, and the Goncourts. He was, moreover, a personal friend of George Sand, his correspondence with whom was published posthumously. By temperament he was shy and morose, and wrote with great intensity, labouring over every word and never satisfied with what he had written. In 1877 he published *Trois Contes*, including *Un Cœur Simple*, *La Légende de Saint-Julien-l'Hospitalier*, and *Hérodiade*. His last work, *Bouvard et Pécuchet*, was unfinished, and was published posthumously in 1881. He died of apoplexy, and was buried in the family vault at Rouen.

F.'s style is a model of purity and strength. His work is tinged with satiric melancholy. He loathed everything mediocre, and his hatred for the *bourgeois* amounted almost to monomania. He wrote with an extraordinary knowledge and insight of the manner of his time, and as a literary artist must be placed between the realistic and romantic schools, belonging to neither and yet having much in common with both. His undoubted preference was for romanticism and it was rather in spite of himself that he achieved so great a triumph with his realistic novel *Madame Bovary*.

His *œuvres complètes* were published in 8 vols. in 1885. Of his works

not already mentioned should be noticed two plays, *Le Candidat* and *Le Château des Cœurs*; and *Par les Champs et par les Grèves*, 1885. Consult Maxime du Camp, *Souvenirs Littéraires*, 1882-83; E. Zola, *Les Romanciers Naturalistes*, 1881; and Lives by E. Faquet, 1899; P. Bourget, 1900; and Ten Brink, 1901.

Flavourings, substances used in cooking so as to render food agreeable to the taste. On the whole, therefore, they are themselves remarkable for their peculiar taste and smell. Meats, gravies, and sauces are flavoured with horse-radish, capers, mustard, pepper, vinegar, garlic, sage, thyme, tarragon, and pickles. Puddings and cakes are often seasoned with ginger, oil of almond, oil of lemon, caraway seeds, vanilla, cloves, honey, and other saccharine substances, fruit essences, allspice, and nutmegs. All good cooks excel in the art of F's.

Flawil, a small tn. 8½ m. W. of St. Gall, with which it is connected by rail, between the lakes Constance and Zurich in the N.E. of Switzerland. Pop. 6210.

Flax (*Linum usitatissimum*), a dicotyledonous plant of the order Linaceæ. It is an annual, growing from 20 to 40 in. in height, bearing a corymb of bright blue flowers. The seed of the plant (commonly known as linseed) is of great value commercially and medicinally. The stem is also of great value in yielding a fibre which is used to make linen. The soil best adapted to the growth of flax is a deep rich loam in which there is much humus or vegetable mould. It thrives well in the rich alluvial land of Zealand and the polders. It is also raised with great success in the light sands of Flanders, but much more careful tillage and manuring are required. The land on which flax is sown must be very free from weeds, the weeding of this crop being a very important part of the expense of cultivation.

F. was used in the very earliest periods of civilisation. It is mentioned in the Book of Exodus, and the lake-dwellers of the Stone Period are known to have used it to make ropes, lines, and fishing-nets. In ancient Egypt the cultivation and preparation of F. were very successful, and down to the fourteenth century Egyptian F. was famous throughout the civilised world.

The preparation of F. is done in six stages, which are: (1) *Pulling*.—This should be done in dry weather, and the plant should be pulled up by the roots. (2) *Rippling*.—That is separating the seeds from the stalks. (3) *Retting or rotting*.—This is done either by soaking in soft water (*water-retting*), or by

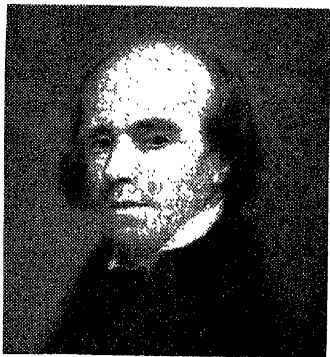
exposing to the dew (*dew-retting*). Schenck's method is now generally used. In this the fibres are soaked for a shorter time in warm water. (4) *Drying*, often called 'grassing,' as the fibre is spread out on short grass to dry. (5) *Breaking* preparatory to scutching. (6) *Scutching*.—The separation of the fibres from the woody part of the stalk. This can be done by hand, though of late scutching machines have been chiefly used.

The F. industry of Great Britain has been steadily decreasing since the middle of the last century. Ireland is the only part now in which any considerable crop is grown. Russia now grows the largest crop of any European country. The F. industry of the United States is also very considerable.

Flax, New Zealand (*Phormium tenax*), also called Flax-lily. Flaxbush, a monocotyledonous plant belonging to the Liliaceæ order. It grows wild in New Zealand, but is half hardy in this country, where it is generally grown in cool greenhouses. Its leaves are from 2 to 6 ft. long, and 2 or 3 in. broad. Their fibres are very strong and fine, and in New Zealand are used to make clothes, dresses, mats, etc. In England the N. Z. F. is used chiefly for ropes and sailcloth. It is obtained by cutting the leaves from a plant, and macerating them, after which the fibres are easily extracted. The New Zealanders obtained more perfect flax by a laborious process of manual separation without maceration. Intensive research work is (1931) being carried out in New Zealand at Massey College on the breeding and selection of improved strains of *Phormium* with a view to raising the general standards of strength and productivity, and encouraging results have already been obtained by the college.

Flaxman, John (1755–1826), an English sculptor, b. at York. He was the son of John F., a moulder of plaster figures and casts in Covent Garden, London. He was a sickly, slightly deformed boy, and spent his childhood mostly indoors, drawing and playing with moulds. He exhibited models at the Free Society of Artists in 1767 and 1769, and won the silver medal of the Royal Academy in 1770. From 1775–87 he earned a livelihood by his beautiful designs for the china ware of Messrs. Wedgwood. In 1787 he married and settled in a studio in Wardour Street, where he executed monumental sculpture for the dead. His work of this class includes monuments of Chatterton in St. Mary Redcliffe, Bristol; of Collins, and of the Rev. T. and Mrs. Ball in Chichester Cathedral; and of Mrs.

Morley in Gloucester Cathedral. For seven years (1787–94) he lived in Italy, studying and perfecting his art, and while there, executed his famous designs for Homer (published 1793), Æschylus (1795), and Dante's *Divina Commedia* (1797), as well as a marble group of 'The Fury of Athamas' from *Ovid*, and a 'Cephalus and Aurora.'



JOHN FLAXMAN

He was elected R.A. in 1800 and appointed professor of sculpture to the Royal Academy in 1810. His work is pure and simple in style, and is executed in the true classic spirit, but occasionally shows weakness in portraying the stronger emotions. The most notable of his later works are monuments of Nelson, Howe, and Sir Joshua Reynolds in St. Paul's, Lord Mansfield and Captain Montague in Westminster Abbey, and 'St. Michael' at Petworth. The Flaxman Gallery in University College, London, was founded by his wife's sister. His *Lectures* were edited with a 'Brief Memoir' in 1829. Consult Sidney Colvin, *The Drawings of Flaxman*, 1876; Allan Cunningham, *Lives of the Most Eminent British Painters, Sculptors, and Architects* (vol. iii.), 1830; *European Magazine*, 1823; and *Art Journal*, 1867, 1868, and 1893.

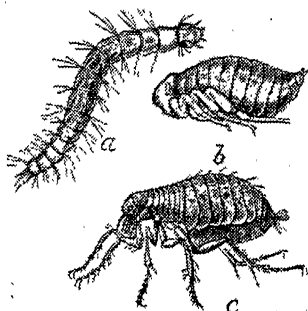
Fleas are parasites of the species *Siphonaptera* (sometimes called *Aphaniptera*). There are more than a hundred varieties known, many of which are specific to some particular bird or mammal. The word is commonly used to refer to the variety that chiefly infest man, the *Pulex irritans*.

The F. is a wingless insect, with a laterally compressed body strongly cased to withstand pressure, small head, and six long powerful legs. It

lives on the blood of warm-blooded animals, though it can evidently live for long periods without such food. The piercing organ is the mandible, and not the maxilla, while the upper lip forms the sucking tube. The F. is justly famous for its jumping powers, which are equal to those of the locust, that is, it can jump two hundred times its own length.

The eggs are not very numerous as a rule. They hatch in from six to twelve days, a wormlike bristly larvæ emerge. These live for about a fortnight feeding on decaying organic matter before forming cocoons. So that the *Pulex irritans* takes about a month to reach maturity.

The jigger or chigoe of S. America and W. Africa is another famous member of the family. The female burrows its way into the feet of men or dogs, and becomes distended with eggs, until it attains the size of a pea. These eggs are discharged with water; and therefore one method of coping with the pest is to keep a stream of water running over the foot until all the eggs are discharged. The jigger can then be easily extracted. It is often removed whole, but if the



c, Common Flea (*Pulex irritans*, Linn.), Europe, etc.; a, larva; b, pupa (magnified). From Osborn, *Bull.* 5 (n.s.), Div. Ent. U.S. Dept. Agr.

abdomen of the jigger is ruptured in the process and the eggs set free in the subcutaneous tissue of the foot, a very troublesome inflammation may ensue.

Flèche, a term in French architecture used generally for a spire and especially for a slender spire of timber covered with lead, rising from the intersection of the nave and transepts of large churches.

Flèche, La, a tn. of France in the dept. of La Sarthe, manufacturing

paper, oil, and leather. It has also a timber trade. Since 1764 it has been the seat of a famous military school. Here also are the heart and a statue of Henry IV. Pop. 10,700.

Fléchier, Esprit (1632-1710), a French preacher, Bishop of Nîmes. He became tutor to Louis Urbain de Caumartin, whom, in 1665, he accompanied to Clermont, and wrote a semi-imaginative description of the *Grands Jours* in his *Memoirs sur les Grand Jours tenus à Clermont*. He had a great reputation for pulpit and funeral oratory. He also wrote *Histoire de Théodose le Grand*; *Histoire du Cardinal Ximènes*; and *Panegyriques des Saints*.

Flecker, James Elroy (1884-1915), Eng. poet and playwright; b. Nov. 5, at Lewisham; elder son of Rev. Wm. Herman Flecker, D.D. Educated at: Dean Close School, Cheltenham; Uppingham; and Trinity College, Oxford. Prepared for consular service by two years at Cambridge, studied Oriental tongues. In Constantinople 1910; and again 1911—transferred to Beirut. Vice-Consul there till 1913. Died of consumption at Davos Platz, Jan. 3. Principal works:—*The Bridge of Fire*, 1907; *The Golden Journey to Samarkand*, 1913; *The Old Ships*—these are poems; a novel, *The King of Alsander*, 1914; two plays—*Hassan* and *Don Juan*—both published posthumously. James was his substitution for Herman his baptismal first name.

Flecknoe, Richard (d. 1678), an Irish Roman Catholic priest and playwright, travelled between 1640 and 1650 in Europe, Asia, Africa, and Brazil. He afterwards settled in London, where he wrote several now forgotten plays. His name is remembered in connection with the poet Dryden, who entitled his merciless satire against Shadwell *Mac-Flecknoe*.

Fleet (O. E. *fleetan*, to float; cf. Ger. *fließen*), a word denoting a collection of ships, and particularly a collection of warships belonging to the navy of one nation, and under the supreme command of a single officer. In Great Britain it should consist of at least ten ships, to each of which are attached torpedo-boats, cruisers, etc. Little difference is made between a fleet and a squadron, the words being used indiscriminately of a division of the Royal Navy. The word is also applied to a number of vessels for fishing or other commercial purposes.

Fleetwood, Charles (d. 1692), Eng. commonwealth soldier; third son of Sir Miles Fleetwood, of Aldwinkle, Northants. His eldest brother was for the king; the second went to

Sweden; and Charles, studying law in Gray's Inn when civil war began, joined parliamentary army as trooper. Colonel of horse at Naseby. M.P. for Marlborough, 1646. Gov. of I. of Wight, 1649. With Cromwell at Dunbar, 1650. Member Council of state, and Lt.-Gen., 1651—led cavalry at Worcester. Married (second of three times) Bridget, dau. of Cromwell and widow of Ireton, 1652. In Ireland as Commander-in-Chief till 1655—for last year Lord-Deputy. One of the major-generals of 1655; one of 'Oliver's lords.' Always for the army as against Parliament; popular with religious extremists. On Oliver's death, Commander-in-Chief of army, 1659, till deprived by Rump. Included in Indemnity at Restoration. Died at Stoke Newington, Oct. 4. Buried in Bunhill Fields.

Fleet Prison, a famous London gaol, which was situated on the E. side of Farringdon Street, on what was formerly known as Fleet Market. It took its name from the Fleet stream, and is supposed to have dated from Norman times. During the reigns of Mary and Elizabeth it was the scene of imprisonment of Catholic and Protestant martyrs, and later of those who were condemned under the Star Chamber and Court of Chancery. In 1640 the Star Chamber was abolished, when it came to be used as the prison for debtors and bankrupts. The prison had many times to be rebuilt. It was destroyed in the reign of Richard II. by the followers of Wat Tyler; in 1666 it was burnt down during the Great Fire of London; and in 1780 it was destroyed during the Gordon Riots. Among its celebrated prisoners were Bishop Hooper, Prynne, Wycherley, and Penn, the colonist of Pennsylvania. Its keeper was called the warden of the Fleet. During the seventeenth, eighteenth, and part of the nineteenth centuries it was notorious for the clandestine marriages contracted within its walls, the first notice of which is in 1613. They were at first celebrated in the Fleet Chapel, but on marriages without banns being prohibited in chapels, any precincts of the Fleet were employed for the performance of these marriages. Such unlicensed marriages were declared to be void by Act of Parliament in 1753, and came into force in March of the following year. Consult Ashton, *The Fleet, its River, Prison, and Marriages*, 1888.

Flegel, Edouard Robert (1855–86), a German traveller in W. Africa, *b.* of German parentage at Vilna in Russia. After a commercial education he devoted his life towards acquiring for Germany the major share of the trade of the Niger. He ascended this

river first in 1879 in the London Missionary Society's steamer, and a year later in his second ascent reached Sokoto. In 1883 he discovered the sources of the Benué to the S. of Adamawa. He wrote *Lose Blätter aus dem Tagebuche meiner Haussa-freunde* (1885), and *Vom Niger-Benué* (edited by K. Flegel, 1890), etc.

Fleischer, Heinrich Leberecht (1801–88), a German Orientalist, *b.* at Schandau in Saxony. He studied theology and Oriental languages at Leipzig (1819–24), where he held the chair of Oriental languages (1836–88). He catalogued the Oriental MSS. in the Royal Library, Dresden (published 1831–34), and edited Abulfeida's *Historia ante-Islamica* (1831–34), and Beidhawi's *Commentary on the Koran* and translated into German Ali's *Hundred Sayings* (1837). He also wrote an account of the Arabic, Turkish, and Persian MSS. in the town library at Leipzig. Consult the Life by F. A. Mueller, translated into English by H. Zold (1892).

Fleming, David Hay, Scottish historian; *b.* May 9, 1849, at St. Andrews; third son of John F. Educ., Madras Coll., St. Andrews. Retired from business, 1883, to devote himself to Scottish history. Publications: *Guide Book to St. Andrews*, 1881; *East Neuk of Fife*, 1886; *Martyrs and Confessors of St. Andrews*, 1887; *Scotland after the Union of the Crowns*, 1890; *Mary Queen of Scots*, 1897; *Three Sections of Scottish History and Life*, 1902; *Handbook on the Scottish Reformation*, 1903; *The Story of the Scottish Covenants in Outline*, 1904; *The Reformation in Scotland*, 1910; *Critical Reviews relating chiefly to Scotland*, 1912; *St. Andrews Cathedral Museum*, 1929.

Fleming, John (1784–1857), a Scottish naturalist, *b.* near Bathgate in Linlithgowshire. He entered the ministry and was appointed Professor of Natural Philosophy at Aberdeen University (1832–43). In the latter year he seceded from the Church of Scotland at the Disruption, and was appointed by Dr. Chalmers to the chair of natural science in the Free Church New College of Edinburgh (1845–57). He criticised the classification of Cuvier in his *Philosophy of Zoology*, 1822. His other works include *British Animals*, 1828; *Molluscan Animals*, 1837; and *Lithology of Edinburgh*, 1859.

Fleming, Sir John Ambrose (*b.* 1849), Eng. electrical engineer, *b.* at Lancaster. He entered St. John's, Cambridge (1877), and after a brilliant career was appointed University Demonstrator in applied mechanics; First Professor of Mathematics and

Physics at University College, Nottingham; electrical engineer to the Edison Electric Lighting Company (1881), in which capacity he superintended the introduction of incandescent electric lighting into England. In 1885 he became Professor of Electrical Engineering in University College, London, and obtained the erection of its engineering and electrical laboratories. He made the first thermionic valve in 1904. Chief publications: *Short Lectures to Electrical Artisans* (2nd ed.), 1885; *Magnets and Electric Currents*, 1897; *Wireless Telegraphy*, 1905; *Radio-telegraphy and Radio-telephony*, 1908; *Propagation of Electric Currents in Telephone and Telegraph Conductors*, 1911; *The Wonders of Wireless Telegraphy*, 1913; *The Thermionic Valve in Radio-telegraphy*, 1919; *Fifty Years of Electricity*, 1921; *Electrons, Electric Waves, and Wireless Telegraphy*, 1923; *The Interrelation of Scientific Research and Electrical Engineering*, 1927. He was knighted in 1929.

Fleming, Paul (1609-40), a Ger. poet. His *Teutsche Poëmata* were published posthumously in 1642. His love-lyrics have a very graceful and happy manner, while his religious poems show genuine feeling and often a glowing ardour. He is probably at his best when writing in the sonnet form. Consult J. Straumer, *Paul Flemings Leben und Orientalische Reisen*, 1892.

Fleming, Sir Sandford (1827-1915), a Canadian engineer, b. at Kirkcaldy, Scotland. He became chief engineer for the Dominion gov. (1867-80), when he superintended the construction of the Inter-Colonial Railway. Author of *The Intercolonial: a History*, 1876; *England and Canada*, 1884; *The New Time Reckoning*, 1889, etc. Died at Halifax, Nova Scotia, July 22. See L. J. Burpee, *Sandford Fleming, Empire-Builder*, 1915.

Flemings, see FLANDERS.

Flemings in England. Flemish settlers probably first came to England in the reign of Henry I., who expelled the Welsh from Lower and S. Dyfed (Pembrokeshire) in favour of Teutonic settlers. These colonists soon became Anglicised, but, up to the present day, have retained many of their Teutonic characteristics and have shown little inclination to intermarry with the Celts. During the reign of Stephen, Flemish weavers established themselves in the E. counties and made Norwich famous as the centre of the clothing industry. The close commercial relations between England and Flanders, established by the *Magnus Intercursus*,

1496, encouraged emigration. During the Reformation many Flemish Protestants sought refuge in this country.

Flemish Bond, see BRICKWORK.

Flemish Language and Literature, see FLANDERS—*Flemish Language and Literature*.

Flensburg, a shipping tn., 19 m. N. of Schleswig in the Prussian prov. of Schleswig-Holstein, at the end of Flensburg Fjord, an inlet of the Baltic. There are iron and machine works, copper and zinc factories, shipbuilding yards, brick, cement, and lime works, and breweries. Fishing and fish-curing are also carried on. The town passed from Denmark to Prussia in 1864. Pop. 60,931.

Flers, a manufacturing tn. in Orne, France. A modern church and a restored fifteenth-century château are the chief buildings of interest. F. is the centre of a linen and cotton manufacturing district. There are also drug, chemical, brick, tile, and dye works. Pop. 13,700.

Flers, Robert de la Motte-Ango, Marquis de (1872-1927), Fr. playwright; b. Nov. 25, at Pont L'Evêque; grandson and great-grandson of members of the Institute. Educated at Lycée Condorcet; studied law. Published verse; on staff of *Soleil and Pigaro*—on last-named, about 1900, met Arman de Caillavet, in collaboration with whom most of his light and mildly humorous dramatic work was done. *L'Amour vicille*, 1907, and *Le Roi*, 1908, are their chief efforts. F. fought in Rumanian army in Great War. Recd. into Academy June 16, 1921. Died at Vittel, July 30.

Flesh (A.-S. *flæsc*), the softer tissues of the body, the muscles, adipose tissue, and generally those parts of an animal commonly used as food. The term is applied also to the body, and its capacity for receiving sense-impressions from phenomena in the world of matter as opposed to spirit, consequently F. stands for the baser parts of human nature. According to Ger. physiologists, F. is substance in the human body whose constitution approximates to that of muscle.

Fleta, an early Latin treatise on the common law of England, with the sub-title *Seu Commentarius juris Anglicani*. It is supposed to have been written during the reign of Edward I., about the year 1290. The author is unknown, but wrote it during his confinement in the Fleet Prison; hence the name. The work is divided into six books, the author having adopted the plan of Bracton, and in many instances transcribed whole pages from him. F. was origin-

ally published by J. Selden from an MS. in the Cottonian Library in 1647, a second edition appearing in 1685. It is also printed in Honard's collection.

Fletcher, Andrew, of Saltoun (1655-1716), a Scottish politician, *b.* at Saltoun (Saltoun), in E. Lothian. After some years spent in travel on the Continent, he entered the Scottish parliament in 1681. There he so vehemently opposed the measures of the Duke of York (subsequently James II.) that he was obliged to escape to Holland. In 1685 he accompanied Monmouth on his expedition to the W. of England. After having had some adventurous travels through Spain, and having fought against the Turks in Hungary, he returned to Scotland at the Revolution of 1688; his estates were restored to him. On the passing of the Act of Union, F. retired from public life, and devoted himself to agriculture, serving his country by introducing Dutch machinery for winnowing and sifting corn. He *d.* in London. Consult *The Political Works of Andrew Fletcher* (London, 1737; Erskine, Earl of Buchan, *Essay on the Lives of Fletcher of Saltoun and the Poet Thomson*, 1792).

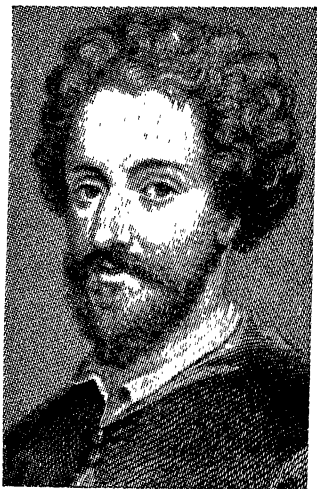
Fletcher, Sir Banister Flight, *b.* Feb. 15, 1866; eldest son of late Prof. Banister Fletcher. Educated at University College, London, and Royal Academy. He obtained: the Architectural Assoc. Medal for Design, 1888; the Arthur Cates Travelling Studentship, 1889; the Godwin Bursary and Travelling Studentship, 1893; the Tite Medal for Architectural Design, 1895; the R.I.B.A. Essay Medal, 1896. For some time lecturer and assistant professor at King's College, London, and examiner to the City and Guilds of London Institute. In Nov. 1908 he was called to the Bar in the Inner Temple. Chairman, City of London School, 1914-15. Sen. Sheriff of City of London, 1918-19. Knighted, 1919. He is university staff lecturer on architecture at London Univ., and sole partner in the firm of Banister Fletcher and Sons. Has a keen sense of the value of old styles of architecture as an integral part of the evolution of modern styles and emphasises the importance of a study of old buildings in architectural education and training. Holds many foreign decorations. He has written, among other works, *The Influence of Material on Architecture*, 1897; *The Architecture of the Twentieth Century from the point of view of public health*, 1901; *Andrea Palladio, his Life and Work*, 1902; *A History of Architecture on the Com-*

parative Method, 1921; *The English Home*.

Fletcher, Giles (c. 1588-1623), an Eng. poet, son of Dr. Giles F., a poet, and cousin of John F. the dramatist. He was *b.* in London, and educated at Westminster School and Trinity College, Cambridge, where he became reader in Gk. grammar (1615) and in Gk. language (1618). He took holy orders and received the rectory of Alderton, Suffolk. His chief work is *Christ's Victorie and Triumph*, 1610, a poem in the epic style, divided into four cantos. It is written in eight-line stanzas, the first five rhyming a, b, a, b, b, the stanza ending with a rhyming triplet, the last line being an Alexandrine. The poem owes much to Spenser and in turn influenced Milton. The best editions are those of Dr. Grosart in the Fuller Worthies Library (1860), and in the early Eng. Poets (1876). Giles F. also contributed to *Sorrow's Joy* on the death of Elizabeth, and wrote *The Reward of the Faithful*, 1623. Consult Fuller's *Worthies of England* (vol. ii.), ed. 1811.

Fletcher, John (1579-1625), a dramatist, was a son of Dr. Richard F., Bishop of London. Born in Dec. at the picturesque village of Rye in Sussex, of which parish his father was then the officiating priest, tradition has it that at the age of twelve he was sent to Bene't (Corpus) College, Cambridge, where he remained until the summer of 1596. The bishop dying then and leaving behind him little property beyond a library, it behoved the young man forthwith to begin to earn his own livelihood. Like many another thrown penniless upon the world without any special qualifications, he looked to his pen for support, and, as all the world now knows, with more of success than even he can then have anticipated. It is said that he at once began to write for Henslowe, a theatrical manager, and perhaps became the stock-dramatist for that personage. Of these early writings and adaptations of the plays of others nothing is known. His history only becomes definite after he made the acquaintance of Francis Beaumont (1584-1616) in, or perhaps somewhat earlier than, 1607. The two men became great friends, lived together near the Globe Theatre, and wrote plays in collaboration. The first fruits of their literary partnership was *The Woman Hater*, 1607. This was the first of their twenty plays, the best of which perhaps are *Philaster*, *The Maid's Tragedy*, *A King and No King*, *The Knight of Malta*, *The Knight of the Burning Pestle*, and *The*

Double Marriage. Beaumont wrote only one masque by himself; F. no fewer than twenty-four plays without assistance, and several, after Beaumont's death, with other collaborators. The literary partnership of Beaumont and F. has attracted much attention, scholars being curious as to the share of each in the plays written jointly. The fact that Beaumont's name comes first is not supposed to indicate that he was the predominant partner, but that when they came together he had already a reputation as an author. It is generally conceded that Beaumont



JOHN FLETCHER

wrote better and had more of the true poetic fervour in him, and that F. had the sprightlier wit and a more vivacious fancy. As against this, it may be put that in *The Faithful Shepherdess*, the most beautiful of pastoral plays in the language, F., who was entirely responsible for it, showed himself a very true poet. Unfortunately, the plays are nearly all so gross that it is impossible to represent them to-day, and this is the great pity because, apart from this defect, they contain so much that is splendid, such beautiful thought, and such admirable poetry. The best edition of the plays is that prepared by A. R. Waller (1905).

Fletcher, Phineas (c. 1582-1650), an Eng. poet, elder son of Dr. Giles F. He was b. at Cranbrook, Kent, and

educated at Eton and King's College, Cambridge. With his brother Giles he contributed to *Sorrow's Joy*, 1603. His pastoral drama, *Sicelides, or Piscatory*, 1614, was written for performance before James I. He took holy orders, and ultimately became rector of Hilgay, Norfolk, where he remained for the rest of his life. His principal work is *The Purple Island, or the Isle of Man*, 1633, written in twelve cantos of seven-line stanzas. It is an allegory of the human body, written in the manner of Spenser. There are many passages of great beauty, but much of the poem is marred by far-fetched conceits. Phineas F.'s other works include two prose treatises, *The Way to Blessedness and Joy in Tribulation*, and a poem called *The Locusts, or Apollyonists*, attacking the Jesuits. His complete works were edited by Dr. Grosart in the Fuller Worthies Library (4 vols.), 1869.

Fleurance, a tn. of France in the dept. of Gers and the arron. of Lectoure, 25 m. S. of Agen. It manufs. gloves and liqueurs. Pop. 4000.

Fleuriau, Aimé Joseph de, Fr. ambassador at the Court of St. James's since Dec. 1924; b. Jan. 24, 1870, at La Rochelle. Educated at: Collège Stanislas; Lycée Saint Louis; Ecole des Sciences Politiques; and Faculté de Droit, Paris. Entered diplomatic service, 1895. Secretary of the Fr. embassies at Constantinople and London under the late Paul Cambon (q.v.), 1898-1921; Fr. Minister in China, 1921-4; honorary doctorate of Durham University. Publication: *L'Activité Réfléchie* (an 'essay on the interior life'), 1911.

Fleur-de-lis, an heraldic device in armorial bearings of many countries, but it is especially associated with the royal house of France. The design is based on the white lily, and shows three flowers joined together, the central one erect, and the other two bending outward. In India and Egypt it was the symbol of the life and resurrection of the god Horus. Some people think it represents the white iris, the 'flower de luce' of Shakespeare. In Rom. and Gothic architecture it is a favourite ornament.

Fleurus, a market tn. of Belgium in Hainaut, situated 15 m. W. of Namur, and 7 m. N.E. of Charleroi. It is noted for three important battles. In 1622 the Gers, under the Duke of Brunswick and Count Ernst von Mansfeld, gained a victory over the Spaniards. In 1690, the Fr. under Luxembourg defeated the allied Dutch and Ger. forces, who were led by the Prince of Wal-

deck. In 1794 the Fr. under Jourdan defeated the Austrians under the Duke of Coburg. Pop. 6600.

Fleury, Flory, or Flowery, in heraldry, indicates that the object is decorated with the fleur-de-lis. The cross flory is a cross of which the extremities end in the fleurs-de-lis. The flowers at the termination turn downwards. The F. differs from the cross flory by its having a line between the ends of the cross and the flowers.

Fleury, André Hercule de (1653-1743), a Fr. cardinal and statesman, b. at Lodève. His father was a tax-collector, and he was educated by the Jesuits and entered the priesthood. In 1679 he obtained the post of chaplain to Queen Maria Theresa, wife of Louis XIV., and in 1698 he became Bishop of Fréjus. In 1715 he was appointed tutor to the king's grandson and heir, later Louis XV., over whom he acquired an extraordinary influence. He was made a cardinal in 1726. F. was over seventy when he became first minister for Louis XV., though he refused the title. His financial administration was such that the usual deficit was turned into a surplus of 15,000,000 livres. He built good roads by forced labour, which caused some discontent. His foreign policy was always peaceful, and he strove hard to maintain the Anglo-Fr. alliance. His severe economies found him unprepared for the war of the Polish Succession (1733), which was forced upon him, though through this Louis XV. gained Lorraine. In 1741 F. was again forced into a war with which he had no sympathy, that of the Austrian Succession. He d. soon after the evacuation of Prague.

Fleury, Claude (1640-1723), a Fr. ecclesiastical historian, b. at Paris, and educated at the college of Louis-le-Grand, then called Clermont. In 1658 he became an advocate to the parlement of Paris and followed the legal profession for nine years. In 1667 he turned from law to theology. In 1672 he was made the tutor of the princes of Conti and the Count of Vermandois, in return for which he received the Cistercian abbey of Loc-Dieu in the diocese of Rhodéz. In 1689 he was appointed sub-preceptor to the Dukes of Anjou, Burgundy, and Berry. He was then presented with the rich priory of Argenteuil. In 1691 he commenced his great work, the *Histoire Ecclésiastique*, published in 20 vols., and continued by J. C. Fabre and Goujet. He wrote many other works, among them *Histoire du droit François*, *Mœurs des Chrétiens*, etc.

Flexile Colloidion see COLLOIDION.

Fliedner, Theodor (1800-64), a

Ger. Protestant divine, b. at Epstun, near Wiesbaden. He was a student of theology at the universities of Gressen and Göttingen. He became a friend of Elizabeth Fry, the famous philanthropist. He worked successfully at reforming the Ger. prisons, and founded the first deaconess house, with its hospital attached, for the sick poor at Kaiserworth. He then collected funds and founded deaconess homes and orphanages and asylums, not only in Ger., but in many parts of Europe.

Fliegende Blätter, a now defunct Ger. comic paper which was published at Munich. It was distinguished for its wit and artistic merit. Wilhelm Busch, one of the most brilliant draughtsmen of his country, became famous both for his writing and caricatures in the *F. B.* After Busch, Adolf Oberlander was the chief draughtsman; his caricatures were not accompanied by words like those of Busch, but told their own jokes in the lines of the drawings. The paper is an amusing pictorial record of the history of Ger. manners since 1844. Its place is now taken by the *Meggendorfer Blätter*, named after the Ger. artist, Meggendorfer.

Flies. All insects which belong to the Diptera (*q.v.*) are commonly called F. This order comprises many families, and is widely distributed over the earth's surface, though certain species are limited to particular districts, as *Glossina morsitans*, the tsetse-fly, to Equatorial Africa. *Musca domestica* is the specific name for the common house-fly; *Calliphora erythrocephala*, the blue-bottle; Culi-cidæ, the gnat family, etc., may be found under their respective headings.

Flight, see FLYING.

Flinders, Matthew (1774-1814), an Eng. hydrographer, navigator, and explorer. He was b. at Donington, Lincolnshire; entered the navy in 1789, and served in the *Bellerophon* at the battle of the 'glorious first of June.' In 1795 he went as midshipman in the *Reliance* to New South Wales, and spent his time studying the outlines and bearings of the Australian coast with George Bass, the surgeon of the *Reliance*. He explored the George river, and later much of the then unknown coast S. of Port Jackson. In 1798 he made a survey of the Furneaux Is., N. of Tasmania. In 1801 he sailed for Australia with several well-known scientific men in the sloop *Investigator*, and thoroughly explored the coast. On his return in H.M.S. *Porpoise* he was wrecked on a coral reef; on his rescue in the schooner *Cumberland* he was taken prisoner by the Fr. at Mauritius.

His captivity lasted six years and ruined his health. He wrote many scientific and interesting works, among them *A Voyage to Terra Australis*, with a volume of maps, etc.

Flinders Petrie, *see* PETRIE, WILLIAM MATTHEW FLINDERS.

Flinders Range, a range of mountains in S. Australia. It extends from the N. of Spencer Gulf, diagonally across the lake district of the S., for about 150 m. The heights are not lofty, the chief summits reaching from 1000 to 3100 ft. Mounts Remarkable, Eyre, Serle, Arden, and McKinley are the most important.

Flint, a hard brown mineral, consisting mainly of silica, found in chalk deposits. It has a specific gravity of 2.6, is frequently harder than quartz, is brittle and breaks with a conchoidal or shell-like fracture. In colour it ranges from dark brown to light yellow or grey. It is opaque to general appearance, but thin plates are seen to be translucent. It occurs usually in nodular masses, but under the microscope exhibits a crystalline structure. Its composition resembles that of quartz; it is almost pure silica with traces of lime, iron, and organic matter. When received from the chalk the outer surface is opaque, rough, and greyish. On being broken, it has a glassy lustre with cloudy, opaline, and speckled effects in its colouring; the broken surface becomes dull after much exposure, and ultimately takes on the dull whitish appearance of a newly-excavated F. Fs. are found usually in bands or layers in chalk, but are sometimes scattered. The layers do not always follow the bedding lines, and appear to indicate the position of fissures in the chalk when it was in the condition of mud. Layers of F. pebbles are common in river-beds and beaches in the E. of England, and concretions of the same nature are found under the name of chert in beds of limestone. The origin of F. is, to an extent, a matter of conjecture. The silica composing it was obtained from the skeletons of sponges and radiolaria. It evidently passed into solution, diffused through the porous mass of the chalk, and was precipitated in concretionary masses where the conditions of pressure, etc., were suitable. It appears to have taken the place of chalk, and fossils situated in the area of precipitation were outlined in silica. The uses of F. arise from its hardness, durability, and its abundance in certain districts. It is used for buildings and road making. When used for mending the surface of roads, some disadvantage results from its breaking up in angular fragments with sharp edges. Before the

days of the lucifer match, flakes of F. were used for lighting tinder by striking them with a steel edge. They were also used for discharging guns before the introduction of percussion caps; and earlier still, tools and weapons were fashioned out of F. by dexterously breaking off flat or curve-flakes by successive blows. At the present time Fs. are ground down for use in the manuf. of earthenware of a superior kind. *See also* FLINT IMPLEMENTS.

Flint: (1) A parl. bor. and cap. of Flintshire, N. Wales. It is situated on the Dee estuary, 12 m. from Chester and 173 m. from London. There are important chemical works, smelting and iron foundries, paper mills, etc., and an export trade in potash, soda, coal, and copper. Flint Castle was begun in the reign of Henry II. and completed by Edward I. It was here that Richard II. was betrayed to Bolingbroke in 1399. In 1643 the Roundheads captured it. Pop. 6302. (2) A tn. of Michigan, U.S.A., and the cap. of the Genesee co., 68 m. N.W. of Detroit. It is situated on the R. Flint, and is served by the Grand Trunk and the Flint and Pere Marquette railways. There is a deaf and dumb asylum here. The lumbering trade is very extensively carried on, and there are large saw mills, etc. Pop. 38,550. (3) A riv. in W. Georgia, U.S.A., with a length of 400 m. It joins the Chattahoochee at the S.W. extremity of the state, and together they form the Appalachicola. It is navigable as far as Albany.

Flint, Austin (1812-86), an American physician, b. at Petersham in Massachusetts. In 1845 he received an appointment as professor of medicine in Chicago, and after holding this post for a year, became in 1847 a professor at Buffalo Medical College. From 1852-56 he held a professorship in Louisville, and from 1858-61 in New Orleans. From this time until his death he was a professor of medicine in New York, and was president of the New York Academy of Medicine from 1872-85. He wrote among other works: *Clinical Reports on Continued Fever, based on Analyses of One Hundred and Sixty-four Cases*, 1852; *A Practical Treatise on the Diagnosis, Pathology, and Treatment of Diseases of the Heart*, 1859; *Phthisis*, 1875.

Flint, Robert (1838-1910), a Scottish philosopher and theologian, was b. in Dumfriesshire and was a student at Glasgow University. In 1859 he became minister of the East Church, Aberdeen, and three years later of Kilconquhar. In 1864 he became professor of moral philosophy at St. Andrews University, and in

1876 professor of divinity at Edinburgh University. He was also Stone lecturer in 1880, and Croall lecturer in 1887-88. Among his works may be mentioned: *Christ's Kingdom on Earth*, 1865; *The Philosophy of History in France and Germany*, 1874; *Theism*, 1877; *Sermons and Addresses*, 1899; *On Theological, Biblical, and other Subjects*, 1905.

Flint Glass, see GLASS.

Flint Implements, weapons and tools fashioned out of flint, the discovery and study of which form an important branch of archaeological research. Prior to 1860 it was generally accepted that the history of



FLINT ARROW HEADS FOUND AT MOORCOCK AND WRETON (YORKS)

the earth involved a series of catastrophes which marked the end of geological periods, and that man only came into existence in the Alluvial period. The appearance of human remains in the midst of animals of the Drift period was attributed to deep burial until Boucher de Perthes demonstrated, by his account of discoveries in the Drift beds at Abbeville in the Somme valley, that man



A FLINT KNIFE 4½ INCHES LONG
(Pickering, Yorks)

existed in that period capable of making well-fashioned stone implements. The discovery of these implements has given the name of Stone Age to the period when they were deposited. These found in the Drift beds are simple in form and rudely finished; these belong to the *Palaeolithic* or Early Stone Age. Flints found in more recent formations are more specialised in form and highly finished by grinding or polishing; these belong to the *Neolithic* or later Stone Age. *Palaeolithic* flint implements are found over a wide area.

They occur in the beds of rivers and lakes and in river gravels in the southern and middle parts of Europe and in S. England. They are not found in Norway, Sweden, and Denmark, nor in Scotland, nor England N. of the Ouse. Three typical forms of the implements can be recognised: the spear-head form from 6 to 8 in. long, the oval form with a sharp edge all round obtained by chipping the stone, and the knife-like form, trimmed or pointed at one end only. It is obvious that at this stage of development the different forms were made to serve for a great variety of purposes. The *Neolithic* implements discovered in peat-bogs and recent alluvium are differentiated to a high degree. Flints have been discovered plainly indicating special functions, as chisels, scrapers, saws, axes, daggers, etc. See Sir J. Evans, *Ancient Stone Implements of Great Britain*, 1897: Lord Avebury, *Prehistoric Times*.

Flint River, an American river rising in the Alleghany Mts., Ga., and joins the Chattahoochee to form the Appalachicola (q.v.). Length 275 miles.

Flints, Liquor of, a solution of flint or silica in potash (silicate of potash). This has the property of being soluble in water.

Flintshire, a maritime co. of N. Wales, with an area of 264 sq. m. It is the smallest Welsh county, and consists of a main portion with a detached district. The former is bounded by the Irish Sea, the Dee estuary, Denbighshire and Cheshire, while the separated part is situated on the r.b. of the Dee, and bounded by Cheshire and Salop. The chief streams are the Dee, Clwyd, and the Alyn. The soil is fertile and the county is an agricultural one, about three-fourths being under cultivation; stock-raising and dairy-farming are flourishing industries. There are some thirty coal mines, but not all are now being worked and the pre-war output of 850,000 tons has declined through the loss of foreign markets. Iron, lead, copper, and limestones are obtained, and there are smelting works and potteries. The principal towns are Flint (the capital), St. Asaph, Mold, Holywell, etc. Rhyl is a popular seaside resort. Pop. 106,466.

Flinty Slate, a siliceous stone, usually black or of a very dark colour. It is employed for testing gold and other precious metals, and has been named on that account 'Touchstone.' The variety originally used was that found in Lydia, Asia Minor.

Flitter-mouse, or Reremouse, the name popularly applied to the bat (q.v.).

Floating Battery, a vessel which is fully armed with cannon and used as a defence from or attack on an enemy. In the siege of Gibraltar (1779-83) the French and Spaniards used them but without success. They were used again in 1854 by the English and French against Russia.

Floating Beacons, *see* LIGHTHOUSE.

Floating Bridge, may be a permanent construction used for ordinary traffic across a river, or temporary, as used in military operations. The former is built of pontoons or boxes of iron, on which is supported a roadway raised considerably above the water, the bridge being securely connected at each end with the shore. In the temporary constructions the pontoons, which may be boats or rafts, are planked over to allow the men to cross the stream.

Floating Docks, *see* DOCK.

Floating Kidney, *see* KIDNEYS—Diseases.

Flodden, Battle of, was fought about the base of the Hill of Flodden in Northumberland, near Branxton, and 10 m. N.W. of Wooler, between the Scots and the Eng. The Scots were under James IV., and the Eng. were commanded by the Earl of Surrey. Henry VIII. was before Tournai prosecuting his war against the Fr. in connection with the 'Holy League.' James IV. of Scotland declared himself the active ally of France, crossed the border with an invading army of 30,000 men and took up a position on Flodden Hill, facing S. Surrey executed a very daring move, which should it fail, would cause the British army to be entrapped, and its position rendered hopeless. He crossed the Till and drew up in the rear of the enemy, between it and Scotland. The Scots then took up a fresh position, facing N., on Branxton Hill. Each army was in four distinct bodies. After a devastating attack from the Eng. archery and cannon, the Scots rushed down the hill and came into close quarters. The Earls of Huntly and Home got the better of the Eng. right under Sir Edmund Howard, but only for a time, it soon rallied with the help of Lord Dacre's reserve corps. The Scots right, under Lennox and Argyle, was completely routed by Sir Edward Stanley. James, fighting bravely among his soldiers, attacked Surrey, but Stanley, turning about, attacked the king's corps in the rear. This corps fought to the last man, but the battle was decided—the Scots were most grievously defeated. They had lost their king, 10,000 men, and the flower of all the noble families of Scotland. The Eng. loss was 5000 men. *See* Scott's *Marmion* where the battle

is described with some accuracy and some imagination; P. Hume Brown's *History of Scotland; The Ballad of Flodden Field*, 1864.

Flogging, or **Whipping**, now practically only a statutory punishment, and the statute prescribing such punishment also fixes the number of strokes. Under various statutes F. or W. of males of any age is authorised in the case of robbery with violence, robbery or assault with intent to rob by a person armed with a weapon, conviction as an incorrigible rogue, discharging firearms at or using any substance with intent to injure or alarm the sovereign; and, as to males under sixteen, for larcenies, malicious damage, and under the Criminal Law Amendment Act, for having or attempting to have carnal knowledge of a girl under thirteen. Women may not be flogged or whipped. F. of male children over seven and under fourteen by order of a magistrate on summary conviction for an indictable offence is inflicted privately by a police constable in the presence of a superior officer and of the parent (if he desires it), and only twelve strokes or less may be given if the offender's age does not exceed fourteen, and only six if he is under twelve. F. may also be inflicted on convicts in prison for mutiny or gross personal violence to a prison officer or servant; but an inquiry must be held before the sentence of F. is carried out. In the navy F. is authorised by the Naval Discipline Act, 1866. Commissioned officers may not be flogged, but a maximum F. of forty-eight strokes may be inflicted on petty officers for mutiny. F. for breaches of discipline in the army was prohibited by the Army Act of 1881, but may be inflicted on persons subject to military law when in prison.

Floire et Blanchefleur. At the time of the Crusades the Franks and the Gks. came into direct contact, and *F. et B.* with several other romances of Byzantine origin were put into Fr. without passing through Latin—probably by oral transmission. Writers in most of the European countries, including Boccaccio in Italy, told the tale from the Fr. version. It is the story of two children who loved each other, were separated, and who came together again happily after passing through many difficulties and dangers. Gaston Paris says that the *chante-fable*, *Aucassin et Nicolette* is another form, though greatly altered, of this story. *See* the poem in Eng. edited by Laing (Early Eng. Text Society).

Flood, Henry (1732-91), a statesman, entered the Irish parliament in 1759, and in 1773 held office as vice-

treasurer of Ireland. At one time he joined forces with Gratton in order to endeavour to translate into reality their dream of an independent Irish parliament; but, differing on other matters, especially on Catholic emancipation, they quarrelled, and in 1783 were within an ace of fighting a duel. In that year, though still an Irish member, he was returned to the Eng. House of Commons, but there he was less successful, and made little or no mark in that assembly. He was an able parliamentarian and one of the greatest orators that Ireland has ever produced. There is a biography by Warden Flood (1838).

Floods and Inundations, due most commonly to excessive rains or melting snows, which cause rivers to rise and overflow their banks. Some rivers present this phenomenon annually. The rising and falling of the Nile in this way is no disaster, but has been made by man the basis of Egyptian agriculture. The Mississippi, the Missouri, and the Ohio valleys are liable to floods, and these can be predicted with comparative accuracy; the last great inundations occurred in 1897 and in 1927 (April-June), the latter being the most serious since records of the river and of its tributaries have been kept. In China, the Hoang-ho R. is especially liable to become swollen after leaving its mountainous region and entering upon its long, low delta course. Levees 70 ft. high proved ineffectual in the disaster of 1887, when 1,000,000 people were drowned and tens of thousands perished by disease and famine ensuing. The breaking up of ice and glacier dams cause inundations in the valleys of the tributaries of the Indus. River floods less catastrophic in nature, but sufficiently disastrous, occurred in France in Jan. 1910, and in England in the summer of 1912. In France heavy rains caused the waters of the Marne, Loire, Yonne, and other rivers to flood their valleys; this swelled the Seine and Paris was inundated. In England, following a rainfall unprecedented in the records of the meteorological office, many of the E. and midland counties suffered, especially Norfolk. 'Tidal waves,' occurring when high winds drive the waters of the sea on to the land at periods of high tides, are a less frequent cause of inundation. Notable floods of this nature occurred in the Netherlands in 1421, but the construction of more and more invulnerable dykes have made the country decreasingly subject to these disasters. The W. Indies, the Gulf Coast, the Middle Atlantic States, etc., are liable to inundation at the

periods of tropical hurricanes. Earthquake shocks disturbing the sea may cause inundation of the adjoining land; the catastrophe in which Lisbon was destroyed in 1775 was of this nature. Devastating floods have been caused by the bursting of reservoirs, that of the Bradfield reservoir, Sheffield (1864), is an instance. For the Noachian flood see DELUGE. For list of floods see Overall's *Dictionary of Chronology*.

Floorcloth, a term applied to a number of materials used as substitutes for carpet. These include oilcloth, linoleum (*q.v.*), kamptulicon, corticine, cork carpet, etc. Oilcloth consists of coarse canvas (burlaps), made of jute or flax, to which a coating of size and several coatings of thick oil paint are applied. It is then often ornamented with patterns. This hard and cold F. was partly superseded (1844) by kamptulicon, made of ground cork and indiarubber; it was expensive and is now little used. Cork carpet is the F. now most extensively employed; it is warmer than the others and deadens the sound of the footsteps. It is made of a preparation of ground cork and oxidised linseed oil reduced to a pulp and pressed in a machine; it has a canvas backing. There is more cork in this than in linoleum and the particles are larger.

Floors, the name applied to the upper stories of houses, those above the ground-floor. Technically the F. is the surface on which people walk. F. are generally constructed of wood, but in large buildings they are often 'fireproof,' and then flat bricks and iron girders are used. In a *single floor*, constructed when the span is not more than 15 ft., the joists pass from side to side of the house. A *double floor* has two sets of joists crossing each other, one for the F. and the other for the ceiling. A *framed floor* has girders in addition to the two sets of joists.

Floquet, Charles Thomas (1828-96), a Fr. statesman was b. at St. Jean Pied-de-Port. He studied in Paris and ranged himself on the side of the Revolutionists in that city. In 1871 he was sent to prison because of his sympathy with the members of the Commune. After his release he continued to take the Republican side, and in 1876 became a member of the Chamber of Deputies, of which he was president from 1885-88, and Prime Minister in the latter year. In the same year he was successful in wounding General Boulanger in a duel, and in the next year resigned from his office. He was compelled to give up public life, however, a year or two later, owing to his being connected with the Panama case.

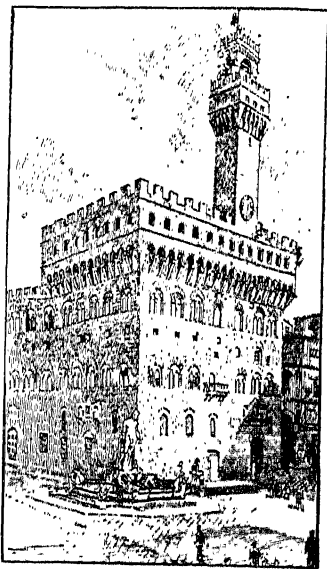
Flora, the anct. Rom. goddess of

the spring, of flowers, and of the 'flower of youth.' The *Floralia*, a theatrical festival in her honour, lasted from April 28 to May 3, and was characterised by licentiousness and unrestrained merriment.

Flora, the term which denotes collectively all the species of plants which are native to a certain district or country. Linnaeus was the first to use the word in this sense. It may also be applied to denote the plants of a certain epoch in time, so that we speak of the Miocene flora.

Florence (It. *Firenze*, Lat. *Flor-entia*), a city of central Italy, the cap. of a prov. of the same name, and formerly cap. of the duchy of Tuscany. It is situated at the foot of the Fiesole Hills in the fertile valley of the Arno on both banks of the river. It is about 160 ft. above the sea-level, 194 m. N.W. of Rome. F. is well called *la città dei fiori*, for flowers grow in luxuriance in its gardens and fields, and the surrounding plain and sloping hills yield an abundance of wheat, Indian corn, vines, olives, fruit trees, the pine, ilex, poplar, etc. The great portion of the city is on the N. bank of the river, which is spanned by four imposing bridges. Many suburbs have sprung up beyond the ant. walls, of which a few towers only remain. Extensions of the city took place during 1864 to 1872, when F. was for one year the seat of the Italian government, and for eight years the capital of Italy; further growth has come about from immigration since 1881. The city with its suburbs, river, bridges, cupolas, towers, market-places and fine squares, its streets and encircling boulevards constitute a marvellous panorama well seen from the Piazza Michel Angiolo, the highest point of the Viale dei Colli, a magnificent 'drive' of modern construction. The Duomo or Cathedral, Santa Maria del Fiore, is its chief building. It was begun by Arnolfo di Cambio in 1296, and consecrated in 1436, when it was called del Fiore (of the flower) either after the name of the city or in reference to the municipal arms, a red lily on a white ground. Its detached Campanile was begun by Giotto, and Brunelleschi designed its dome. In front of the Duomo is the octagonal Baptistery of San Giovanni, the old cathedral of F. Of its three splendid bronze gates one is the work of Andrea Pisano (1330), and the other two, called by Michelangelo in admiration 'The Gates of Paradise,' are Lorenzo Ghiberti's masterpiece (1403-47). Other famous churches are Santa Maria Novella, Santa Croce (F.'s pantheon, with frescoes by Giotto), Santo Spirito, and San Marco,

whose convent has frescoes by Fra Angelico and was the home of Bartolomeo and Savonarola. F. possesses four important libraries containing many rare manuscripts, illuminated missals, and Bibles, etc.; they are the Biblioteca Nazionale, the Marcelliana, the Laurentiana, and the Riccardiana. Rich collections of mediæval artistic and historical treasures are stored in its galleries



FLORENCE, THE PALAZZO VECCHIO

and museums, the chief among which are the Uffizi Gallery and the Pitti Palace. Here are masterpieces by Raphael, Andrea del Sarto, Perugino, Ghirlandajo, Botticelli, the Lippis, etc., with some fine sculpture. Priceless archaeological collections are to be seen in the museum of the Duomo, the Accademia and the Casa Buonarrotti. The streets of F. are unique with their splendid mediæval palaces, the old residences of the Florentine noble families; the Palazzo Vecchio, now the town hall, once the seat of gov. of the Republic of F., and the Palazzo Riccardi, now the prefecture, once the residence of the Medici, are among the most celebrated. Many of the old palaces have been restored as far as possible to their pristine grandeur. The principal industrial occupations of the Florentines are

those connected with vintaging and oil-making, together with certain artistic handicrafts such as jewel, mosaic, majolica and porcelain making, straw-plaiting and the fabrication of silk and woollen textures. Much of the city's prosperity is occasioned by the tourists who flock here from all quarters of the globe. Education is free and compulsory. The university of F. is one of the first in Italy, and there are many trade and professional schools with some important learned societies, such as the Accademia della Crusca, for the study of the Italian language, and the Società Dantesca. There is an agricultural institute, a high school of forestry, and a women's training college. The 'Confraternità della Misericordia' is a most interesting charitable work. Its members belong to the highest as well as to the lowest classes of society, and they are bound to quit immediately all work on being summoned by their oratory bell and give aid in accident, illness, death, or any emergency. The British Institute, founded in 1918, occupies the famous palace of the Antinori. Pop. (1929) 275,835.

History.—Florentia, an old Rom. colony, was rebuilt by Julius Cæsar, 59 B.C. to serve as a military post at the ford of the Arno. It rose into some importance under the Carolingian emperors who included it in the Tuscan margravate. It was bequeathed in feudal legacy to Pope Gregory VII. by the celebrated Countess Mathilda (1115), and became, in consequence, the scene of conflicts between the popes and the emperors. F. stood for the papacy, but early began to develop a spirit of local patriotism and of freedom, and soon became bold and strong enough to close her gates against Frederick Barbarossa. The Florentines were already great traders, and they now formed themselves into *arti* or trade guilds, and in order to hold public office it was necessary to belong to one of these guilds. They waged war against the feudal lords whose castles were in the neighbourhood, and who had interfered with their trade, forcing them to become citizens and to live in F. at least three months in the year. They gradually threw off the rule of the emperors, and after the death of Frederick II. in 1250, F. was proclaimed a republic. In the twelfth and thirteenth centuries F. was involved in the struggles between the Guelfs and the Ghibellines, the former the democratic-republican-papist party, the latter favourable to the aristocrats and the emperor. F. which was chiefly Guef formed the 'Tuscan League' with other cities, and fought against Pisa, Siena, and

other Ghibelline towns. The rich burghers with their guilds now governed F., taking the power from the nobles by the 'Ordinances of Justice.' The executive power, formerly invested in the Podestà and Captain of the People, was now transferred to the Priori (eight members), and the Gonfaloniere of justice. And now F. was torn by the feuds of the Neri and Bianchi ('Blacks' and 'Whites'), two factions born of the opposition of the nobles to the new constitution. Dante was one of the Priori, and was banished with the Whites in 1302. In spite of the constant fighting entailed by these feuds, F. grew in splendour and prosperity, fine churches, palaces, and libraries were built, Florentine cloth merchants, jewellers and goldsmiths visited all the foreign markets and established banks everywhere, about 400,000 gold florins were minted every year, and the city was a centre of art and letters. All this was made possible by the solidarity of the trade guilds. In 1348 the city was decimated by plague, the 'Black Death,' described by Boccaccio. From 1434 to 1527 the Medici held sway, and under them F. attained the summit of its magnificence. Cosimo, the first of the name, a princely merchant, was very popular and rose to a position of great power. Lorenzo de Medici, called 'The Magnificent,' was the most famous and powerful of the family. They were several times banished for aiming at sovereign power, and were many times recalled. They patronised art and letters, and a school of painters came into being, represented by Cimabue, Leonardo, Giotto, the Lippi, Del Sarto, and others. F. was the centre of the Renaissance. But the succeeding members of the Medici family degenerated in character, and with them, to some extent, the Florentines. The work of Savonarola, who tried to reform the manners and morals of the citizens, and to re-establish a democratic gov. after the city had been delivered from the Medici, took place in the latter part of the fifteenth century. He was abandoned by the people and burnt at the stake. F. ceased to be an independent republic in 1532 to become the capital of the Grand-Duchy of Tuscany. In 1808 Tuscany, and F. with it, was annexed to the Fr. empire, and in 1865 the city became the capital of the kingdom of Italy, and remained the capital until 1871. F. is the birth-place of Dante (1265), Donatello the sculptor (1383), Ghiberti (1378), of Machiavelli (1469), and of Florence Nightingale. See Villari, *The Two First Centuries of Florentine History*

(Eng. trans.), 1894, and *Savonarola*; Mrs. Oliphant, *Makers of Florence*; Perrens, *The History of Florence*; Brown, *Florence Past and Present*, and a volume of the *Medieval Town Series* (Dent), Capponi, *Storia della Repubblica Firenze*; Ruskin, *Mornings in Florence*; and Staley, *The Guilds of Florence*, 1906.

Florence: (1) A prov. of Central Italy, capital Florence. It embraces part of the basin of the Arno, is traversed by the Apennines, has an area of 2265 sq. m. and a pop. of 999,405. It produces wine, oil, the olive, and flowers, and carries on silk weaving and sheep breeding. (2) A city of Alabama, U.S.A., co. seat of Lauderdale co., situated on a plateau 200 ft. above the Tennessee R., on its N. bank. Its industries, which are developing rapidly, are connected with lumber, coal and iron mining, and the manufacture of flour, wagons, boilers, engines, fertilisers, cloth, and cotton-seed oil. Pop. 11,729. (3) The co. seat of Florence co., S. Carolina, U.S.A. Its industries include tobacco and cotton growing, lumbering, and cotton-seed oil manufacture; it has machine shops and railway works. Pop. 14,744.

Florence of Worcester (d. 1118), an old Eng. chronicler. He was a monk of Worcester. He appears to have lived most of his life, and certainly d. in the monastery at Worcester. We know nothing else about him. He wrote the *Chronicon ex Chronicis*, beginning with the creation and ending in 1117. A certain John of Worcester continued the work up to 1141. It is interesting to compare the work with other English chronicles till his independent work from 1108; the main part appears to have been taken from the chronicle of Marianus, an Irish recluse who lived at Fulda. It was translated by B. Thorpe in 1848, and by T. Forester in 1854, for Bohn's *Antiquarian Library*.

Florentinus, a Roman jurist, was the writer of *Institutiones* in several books. There is no other work by which he is known, but many extracts from his book are still preserved.

Flores: (1) An island of the E. Indies, belonging to the Dutch. It has an area of about 5850 sq. m., the interior being but very little known. Rice and maize are grown here, while sandal wood and cinnamon are among the exports. Pop. 250,000. (2) An island in the Atlantic Ocean belonging to the Azores group. It is one of the most westerly of the group, and is very fertile. The capital is Santa Cruz. Sir Richard Grenville's defence off Azores in 1591 is commemorated in Tennyson's *Revenge*. Pop. about 10,000. (3) A dept. of Uruguay, S.

America. Its chief town is Trinidad. Area 1744 sq. m. Pop. about 16,000.

Flores, Juan José (1800-64), a Spanish-American soldier who became first president of Ecuador. He was b. at Venezuela, and fought under Bolivar in the War of Independence. He was commander-in-chief in the campaign against Peru, and when Ecuador became independent (1830) he framed her constitution and was elected president.

Florez, Enrique (1701-73), a Spanish historian, was b. at Valladolid, and joined a religious order when quite young. He afterwards devoted all his time to the writing of history, his chief works being *España Sagrada*, 1747-73; *Memorias de las Reynas Catolicas*, 1770.

Florian, Jean Pierre Claris de (1755-94), a French poet and writer of romance. He was b. at the château of Florian, near Sauve. His uncle, the Marquis of Florian, introduced him to Voltaire, who greatly influenced his ideas on literature. He obtained a commission in a dragoon regiment, but at the beginning of the Revolution he retired to Sceaux, where he was captured and imprisoned. He only lived a few months after his release. One of his first literary works was an eclogue entitled *Ruth*, crowned by the French Academy in 1784. He wrote many poems and comedies; among them are *Le Bon Ménage*, *Numa Pompilius*, *Galatée*, etc. In 1792 he wrote his famous *Fables*, and translated *Don Quixote* into French. His style was sentimental, and his comedies are delicately expressed with a certain amount of charm and piquancy. He was elected to the French Academy in 1788.

Florianopolis (formerly named Des-terro), a city and seaport of Brazil, which is named after Marshal Floriano Peixoto, President of Brazil (1891-4). It is situated on the western side of the island of Santa Catharina off the coast of the state of the same name (pop. of the state 847,000), of which it is the capital. Agriculture is the principal industry, and dairy produce is largely exported. The port affords good accommodation for smaller vessels. A suspension bridge, called the F. suspension bridge, which adjoins the city, was completed in 1926. Pop. 60,000.

Florida (Land of Flowers), the 'peninsula' or 'everglade' state, the most southern of the states of U.S.A. Its length is 400 m., its average width 95 m., and its area 54,861 sq. m., about 4440 of which is lake and river area. Its surface seldom rises more than 200 ft. above the sea-level; lakes, swamps, and savannah lands are frequent in the centre, while the

S. is characterised by submerged, saw-grass plains called 'everglades,' whose pure water, about a foot deep, abounds in fish. To these everglades F.'s largest lake, Okeechobee (1200 sq. m.), contributes a subterranean supply. The principal rivers are St. John's, the Withacoochee, and the Caloosahatchee. The climate of F. is so equable and healthful that the state has been called the 'American Riviera,' and has become a favourite health resort; immense mineral springs enhance its value. The leading industries are those connected with agriculture (cereals, the peanut, potato, tomato, beans, tobacco, celery, etc., are cultivated), cigar-making, lumber (the yellow pine, cypress, red cedar, oak, and catalpa grow abundantly), phosphate rock, and fruit-growing (orange, pineapple, grapefruit, etc.). The chief towns are Tallahassee (capital), Pensacola, Jacksonville, and Key West. The pop. (1927) was 1,363,000, of which about one-third were coloured. The state is increasingly prosperous, and higher education is encouraged. F. was discovered in 1512 by Ponce de Leon, was ceded by Spain to England in 1763, became an American possession in 1821, a territory of U.S.A. in 1822, and was admitted to statehood in 1845. Miami and Palm Beach, the two chief resorts for residents and visitors, have greatly increased in popularity of recent years and the trade of Florida has thereby received a very helpful stimulus; many of its industries are in a state of vigorous development. The government follows the usual rules of the states of the republic, its 95 representatives and 33 members of the Senate being all chosen at one election.

Florida, a cattle-rearing dept. of Uruguay, whose capital of the same name is about 70 m. N. of Montevideo. Area 4763 sq. m. Pop. (1926) 83,100.

Florida Reefs, or Keys, a bow-shaped chain of small islands and sand reefs (or keys), extending S.W. for 220 m. from Cape Florida. They parallel the E. coast of Florida and enclose an inland waterway. The ports Fernandina, Jacksonville, and Key West are on the keys. There is an active sponge industry.

Florin (Fr. *florin*, from It. *florino*, a florin, the word being derived from *fiore*, a flower, because the coin bore a lily on the obverse), the name first given to a gold coin struck in Florence in the eleventh century. It was called also a 'fiorino' in Europe, and was much used in commerce, other countries issuing similar coins. In England Edward III. ordered every pound of gold to be coined into fifty

fiorines (value six shillings each); and the 'gulden' and 'gilders' of Germany and Holland came into being. Edward's fiorines were soon discontinued, but in 1849 Queen Victoria issued a silver F. (two shillings), which became known as the 'goddess' or 'graceless' F., because the words *Dei Gratia* were omitted; this omission was rectified in 1852. The double F. of 1887 was discontinued in 1890.



THE 'GRACELESS' FLORIN
(Issued in 1849)

Florio, John (c. 1553-1625), an English author and translator, was the son of Italian Protestants, and was b. in London, where his parents had taken refuge. He became a professor of languages at Oxford, and in 1603 was appointed to read Italian with Queen Anne, being made groom of the chamber in the following year. He also taught Prince Henry, son of James I. He is best known as a translator by his translation of Montaigne's essays, 1603. Among his other works are: *Florio, his first fruites which yielde familiar speech, merie proverbes, wittie sentences and golden sayings, also a perfect Introduction to the Italian and English Tongues*, 1578; *A Worlde of Wordes or most Copious and Exact Dictionarie in Italian and English*, 1598.

Floris, Frans (c. 1520-70), a painter, b. at Antwerp. He began as a sculptor under his father, and later went to Liège, where he studied painting under Lambert Lombard. He then visited Italy, and while in Rome made a careful study of the work of Michelangelo, and his work shows very plainly the influence of that great master. In 1540 he opened a school of painting in Antwerp. Among his best works are: 'The Last Judgment' (in Brussels); 'The Fall of Rebellious Angels' (in Antwerp). Florists' Flowers, see FLOWERS, FLORISTS'.

Florus, an historian of Rome, who wrote during the reign of Trajan or Hadrian. Very few definite facts of his life are known, but his work was a history of Rome from the foundation of the city to the time of

Augustus. It is founded principally on Livy's work, and although its arrangement is good, it leaves much to be desired in other ways. One of the best known editions is that by Halm (Leipzig, 1879).

Flory (in heraldry), *see* FLEURY.

Flotation, the study of the conditions under which bodies float. If the weight of a body be greater than the weight of the fluid displaced, the body will tend to sink; if the weight of the body be equal to that of the displaced fluid, it will rest anywhere in the fluid; if the weight of the fluid displaced be greater than the weight of the body, the body will be forced upwards to the surface, so that it floats partly immersed. As the pressure upwards upon a floating body must be equal to the pressure downwards due to the weight of the body, it follows that the weight of the fluid displaced is equal to the total weight of the body. It also follows that the pressure upwards shall act in the same straight line as the pressure downwards, so that the centre of gravity of a floating body is in the same vertical line as the centre of buoyancy, or the centre of gravity of the displaced fluid. If the body be slightly displaced, the moment of the two forces tends to restore it to its original position if the centre of gravity be below the centre of buoyancy, but tends to overturn it if the centre of gravity be above the centre of buoyancy; in the former case the floating body is in stable equilibrium, in the latter it is in unstable equilibrium. Hence the necessity for keeping the centre of gravity of a ship as low as possible. A certain amount of displacement is inevitable, and if the centre of gravity be raised by heavy dock loads there is risk of capsizing, while the lowering of the centre of gravity by ballasting tends to ensure stability.

Flotow, Friedrich, Baron Von (1812-83), a German composer, *b.* at Tendorf in Mecklenburg. His first great success was *Le Naufrage de la Méduse*, an opera produced in 1839; *Alessandro Stradella*, in 1844, and *Martha*, in 1847, being equally popular. Among his later operas may be mentioned: *Indra*, 1853; *La Veuve Grapin*, 1859; and *L'Ombre*, 1869. The characteristics of his works are liveliness and grace, combined with pleasing melodies.

Flotsam, Jetsam, and Ligan, the names given in English law to goods lost at sea as distinguished from *wreck* or goods which come to land. *Flotsam* 'is where goods continue swimming on the surface of the waves' (Blackstone). *Jetsam* or *jettison* connotes goods cast into the sea

which remain under water; *ligan* are goods which are attached to a cork or buoy in order that they may be found again. Flotsam, jetsam, and ligan are adjudged to the crown if no owner appears within a year and a day, while *wreck* belongs to the crown in any case.

Flounder, or *Pleuronectes flesus*, a flat fish (*q.v.*). It is common to the northern, temperate, and Arctic seas of both hemispheres, and is almost as much a fresh-water fish as a sea fish. The *F.* rarely exceeds a length of 12 in., or a weight of 1½ lb., but those caught in America are larger and heavier. Nearly all *Fs.* are excellent eating.

Flour (the word is a variant of *flower*), in general language the powdered grain of wheat. When the word is used to denote the powdered grain of other cereals, a qualifying term is added—rye *F.*, barley *F.*, etc. Wheat *F.* is used for making bread in preference to the *F.* of other grains, not on account of any superiority in its nutritive properties, but because of the presence in it of a special gluten, a highly tenacious, sticky substance which enables the dough to retain the carbonic acid gas introduced into it in the form of yeast or baking powder. This makes the bread light and spongy. Dough made with the *F.* of other grains is granular, and this allows the gas to escape. The following comparison shows that in essential nutritive constituents other grains equal or surpass wheat:

	Starch,	Sugar,
	Protein	starch, etc.
Wheat	11.9	71.9
Oats	11.8	59.7
Barley	12.4	69.8

The best wheat (the richest in gluten) comes from Minnesota, Manitoba, Hungary, and Russia. Great Britain imports *F.* from Canada in rapidly increasing quantities. In 1928 the values of different kinds of cereals imported into Great Britain from Canada were as follows: wheat, £22,083,000; barley, £888,000; oats, £848,000; rye, £89,000; wheat-meal and flour, £3,549,000.

Flourens, Marie Jean Pierre (1794-1867), a French physiologist, *b.* at Maureilhan, Hérault. He began his career by assisting Cuvier in 1828, and later received an appointment at the Jardin du Roi. He afterwards held a professorship of the Collège de France, became perpetual secretary of the Academy of Sciences, in 1840 a member of the French Academy, and in 1846 was made a peer of France. He wrote many works on physiology and anatomy, among them: *Anatomie Générale de la Peau*

et des Membranes Muqueuses, 1843; *Théorie Expérimentale de la Formation des Os*, 1847.

Flour-milling. *Ancient method.*—More than 6000 years ago people ceased to eat grain in its wild state and began to break it up with a rude kind of pestle and mortar. Later a primitive hand mill came into use. This consisted of two stones with roughened surfaces between which the grain was ground. The next mill evolved was the *quern*, formed of two circular stones, the upper revolving on the lower, to which it was attached by a metal or wooden pin. The corn was introduced between the stones by means of a funnel in the upper stone which had also a small hole near its edge into which a stick was inserted to serve as a handle. The *quern* is still used by semi-civilised peoples, and in remote parts of Ireland, the Hebrides, and the Shetlands. Down to 1874 the grindstone remained the basis of the flour-mill, but the 'power' was supplied by animal labour, by wind, and by water. Grindstones are still used in the smaller mills. They are made of *buhr*, a very hard silicate. They are from 4 to 6 ft. in diameter, and their surfaces are grooved or furrowed from centre to circumference. The 'hopper' supplies the grain through the centre of the upper stone; the wheat is pushed along the grooves and broken upon the ridges. *Modern method.*—In modern F. iron or steel rollers worked by steam have taken the place of grindstones. The first successful steam mill was erected in London in 1784, and iron rollers were first used in 1840, following their introduction in Budapest. Hungary became the world centre for F. on account of this improvement. Minneapolis soon adopted it, becoming in her turn the world centre, and remaining so to the present day. From 1880 the system of roller-milling has been in operation in all large mills. *Process.*—The first operation consists in removing the husk (*bran*) from the grain. That this may be successfully done, that is, without particles of bran becoming incorporated with the flour, the grain is 'tempered' (damped) after being thoroughly cleaned in revolving cylinders. Then it is passed through several pairs of grooved iron rollers, each pair having finer grooves than the last as well as a different angle of grooving and a different rate of movement. Two products result: bran and 'middlings' or 'semolina.' Next the semolina is 'purified,' i.e. the finer and coarser particles are assorted, and any 'offal' or extrane-

ous particles of tissue and fibre carried off in revolving, gauze-covered cylinders. Flour making proper is the object of the next operation. The semolina is passed through various pairs of *smooth* rollers and 'flour' results, but as the particles are not even now of uniform size, it is further treated in a 'dresser,' or revolving cylinder covered with fine Swiss silk. The product alone which is able to pass through the meshes (12,100 to the sq. in.) is accepted as flour, the remainder, a fluffy tissue, is used as food for cattle. See Bennett and Elton, *History of Corn Milling*, 1898.

Flower, a shoot bearing a number of leaves modified for the purpose of reproduction, and frequently with other leaves forming an outer investment. A typical F. consists of four whorls of floral leaves, the carpels, constituting the pistil, stamens, petals, and sepals, but there are many and varied modifications from this type. The pistil, together with the stamens, are the essential organs of a plant, because seeds cannot be formed if these are absent. The petals collectively form the corolla, and the sepals constitute the calyx. When sepals and petals are indistinguishable from one another, as in daffodil, and many monocotyledons, etc., a perianth occurs. In dicotyledons, the calyx, when present, is usually green as in primrose, and of a protective nature, but it may be yellow as in marsh marigold, or blue as in larkspur. The corolla is usually brightly coloured, or white, sometimes it is absent altogether, as in *Thalictrum*, the rue. A typical stamen consists of a stalk, or filament, bearing a terminal anther which contains the pollen. The pollen is the male element in the sexual process. The pistil is the female organ and consists usually of three parts, the ovary or seed bag, made up of carpels, above which is a shaft-like tube, the style, at the apex of which is the stigma, the receptive organ for the pollen grains. A F. is said to be complete when both calyx and corolla are present; it is incomplete if one or both of these envelopes are absent. If both stamens and pistil occur together, the F. is said to be perfect or hermaphrodite; it is imperfect or unisexual when only one class of essential organs is present, and the Fs. are then either staminate (male) or pistillate (female). Where the floral leaves in each whorl are similar in size and shape, the F. can be divided symmetrically in several directions, and is said to be regular, as in buttercups; otherwise it is irregular, as in peas, orchids, etc. Much of the classification of plants is based

upon the characters of the F., thus, dicotyledons are subdivided into polypetalæ and gamopetalæ. The Fs. of the former have petals free from one another, as in buttercup; those of the latter have their petals joined to one another, so forming a tube, cylinder, etc., as in primrose. In dicotyledonous plants the parts of the F. are usually in fours or fives or their multiples; thus a primrose has five sepals, five petals, five stamens, and a pistil made up of five carpels; members of the pink family (Caryophyllaceæ) usually have ten stamens. Monocotyledons, on the other hand,

spring from the same level as the ovary, as in rose, blackberry, etc.; and it is epigynous when the petals and stamens are inserted above the ovary, as in the lily, and members of *Umbellifera* and others; in this case the ovary is said to be inferior.

In order that a F. may produce seed, fertilisation is necessary, and pollination is a preliminary step to this end. By pollination is meant the bringing of the pollen into contact with the stigma of the pistil, and there are all sorts of wonderful devices in plants to effect this end. There are two chief ways by which this is brought about, one is by the agency of insects and sometimes by birds, and the other is by wind. Entomophilous plants, as they are called in the first case, are attractive either by their colour or smell or both, and the insect visits the F. for booty of pollen or honey, and incidentally causes the pollen of one F. to fall upon the stigma of another. The ways in which certain Fs. are specially adapted for visits from certain insects, and the relative positions of stamens and pistil so as to be used to the best advantage, is a subject in itself. Fs. which open in the evening are usually of a pale colour and have a strong smell—they are pollinated by moths and evening insects. Anemophilous plants, those which are wind-pollinated, often bloom before the leaves are developed, their Fs. are usually inconspicuous, they produce no honey, they have no smell, and pollen is produced in large quantities to atone for waste; grasses and many trees belong to this type. It has been proved by experiment that cross-fertilisation, i.e. when the pollen contents of one F. are brought into contact with the pistil contents of another F., whether on the same or on a different plant (but always of the same species), is more beneficial than self-fertilisation, but often if cross-pollination does not take place, the plant becomes self-pollinated. In some cases, however, self-pollination is impossible, for various reasons. (1) The anthers and stigma are in such relative positions to one another that pollen cannot possibly reach the stigma of the same F., e.g. *aristolochia*. (2) The stigma and anthers of the same F. mature at different times; Fs. in which this occurs are either protandrous, when the anthers are first developed and have already shed their pollen when the stigma of the same F. is capable of receiving it; or they are protogynous, when the stigma is withered before the pollen is shed; this is the more uncommon of the two forms, but occurs in arum and in the figwort, etc. Most composites, cam-

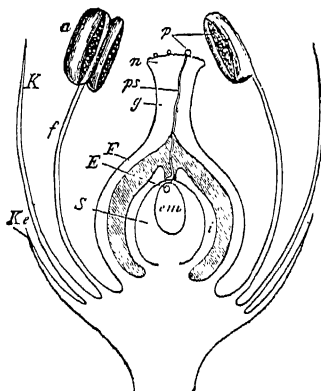


DIAGRAM OF COMPLETE FLOWER

Ke, calyx; *k*, corolla; *f*, filament of stamen; *a*, anther; *p*, showing pollen grains in position and on stigma; *ps*, pollen-tube in the style; the central portion is the pistil, and it consists of *n*, stigma; *g*, style; the swollen portion is the ovary; *S*, ovule; *E*, oosphere; *em*, embryo sac; *i*, integuments; *F*, wall of pistil.

have their parts in threes or multiples; thus, in the lily, there are six perianth leaves, six stamens and three carpels. Mention must be made of the receptacle, a very important structure in the classification of flowering plants, as upon it depends the insertion, as it is called, of the floral leaves. Thus, if sepals, petals, stamens and carpels spring one beneath the other from a more or less conical receptacle, such as occurs in the buttercup, the F. is said to be hypogynous and the ovary is superior. It is perigynous when the stamens

panulas, etc., are protandrous. (3) When the Fs. are unisexual, as in willow, etc. When pollination has once been effected, the pollen grain germinates on the stigma and sends out a tube which forces its way down the style until it reaches the micropyle of an ovule. The contents of the pollen grain then travel down the tube and fuse with the contents of the ovule. This act of fusion is fertilisation, the most direct result of which is the development of the embryo, and the conversion of ovule into seed.

Flower, Sir William Henry (1831-99), an Eng. anatomist and zoologist. Held the curatorship of the Hunterian Museum of the Royal College of Surgeons in 1861; and, in 1884, the directorship of the British Museum of Natural History. Published: *An Introduction to the Osteology of the Mammalia*, 1870; *Fashion in Deformity as illustrated in the Customs of Barbarous and Civilised Races*, 1881; *The Horse*, 1891; *Essays on Museums and other subjects connected with Natural History*, 1898.

Flower-de-luce, see **FLEUR-DE-LIS**, and **IRIS**.

Flower Gardens have from earliest times been cultivated for pleasure and profit. Especially in the E., where the confinement of a building is so oppressive, we have records of gardens of surpassing beauty. The first mention of them is the description of Solomon's gardens, which were, however, overshadowed by the hanging gardens of Babylon, one of the seven wonders of the world. They were irrigated by water from the Euphrates, and contained a wonderful variety of effects. Persiangardens supplied the type which the Gk. gardeners followed, though the latter introduced glass in the construction of conservatories. To come down to comparatively modern gardens, the Fr. style is one of characteristic elegance. Le Nôtre, a gardener of the seventeenth century, obtained fame in the reign of Louis XIV. by laying out the gardens of Versailles. In 1742 Richard, Viscount Ranelagh, threw open the fine gardens which he had built to his mansion at Ranelagh, and they remained a favourite public resort till 1803. In 1661 Vauxhall Gardens also became famous. Landscape gardening reaches a state of highest perfection in Japan, where they attain the most successful results by following a picturesque irregularity. Flower gardens have always been a source of pleasure to English people. Bacon's essay 'Of Gardens' is a fine description of one of the Elizabethan period. As in other things garden flowers have their period of popularity and change for newer varieties, and

the foxglove, lavender, marigold, and pansy are superseded by geranium, hyacinth, and chrysanthemum.

Flower Painting. In Europe figure-painting has always been the form of art most studied, landscape-painting being a later development. Flowers, although used, often in a conventionalised form, to decorate illuminated manuscripts (see **ILLUMINATION OF MSS.**), did not themselves form the subject of pictures in the earlier centuries of the Christian era. In the seventeenth and eighteenth centuries the Flemish painters developed the art of flower-painting to a high degree. Jan Breughel (1568-1675), the portrait-painter, exquisitely reproduced living flowers. Frans Snyders (1579-1657) frequently collaborated with Rubens by supplying the still life in the master's paintings. Fairy-like in his treatment of blossoms was Jan Davidsz van de Heem (1606-83), whose son Cornelis inherited his father's gift to a lesser degree. Daniel Seghers (1590-1661) was, however, the supreme painter of flowers, refusing to blend his subject with any other forms of still life, although he used his floral decorations to embellish his devotional subjects. Among the Fr. artists flower-painting became an important study in the nineteenth century, when Edouard Manet (1832-83), Henri Fantin-Latour (1836-1904), and Claude Monet (1840-1926) were regarded as masters of this delicate art. In the East it has been a cult for many centuries. 'Before a masterpiece of Fantin-Latour we feel that the flowers have been taken from field or garden to be grouped before us, a feast for the eye,' says Laurence Binyon in *Painting in the Far East*, 'but the Chinese artist brings us to the flower, that we may contemplate it and take from it into our souls something of the beauty of life which neither sows nor spins.' The plum blossom and lotus flower provided a sufficient theme for the Oriental artists without need of human figures, and among the most famous flower painters of the Sung period are Hsu Hsi (tenth century), Chao Ch'ang (eleventh century), and Li Ti (twelfth century). See **CHINA—Chinese Art**.

Flower Pots, receptacles in which flowers may be grown and at the same time may be easily moved from one place to another. They are made from the very smallest size, which is used for seedlings, and is only about 2 in. deep, to those which will take a large plant and may be 2 or 3 ft. deep. They may be glazed, as those used for ornamental purposes, or unglazed, but each variety is provided with a

hole in the bottom to allow the water to drain away, and if used in a house is placed in a saucer.

Flower Shows were originated by the London Horticultural Society, which was founded by Thomas Andrew Knight in 1804 and received its charter in 1808. The object of the society is to encourage and promote the cultivation of plants, flowers, fruits and vegetables. One of the most valuable means to this end was the establishment of experimental gardens in 1817, which were removed to their present site in Chiswick in 1822. From these gardens plants and seeds were distributed to all parts of the world. At the meetings of the society members and others exhibited plants, fruits, and flowers, and, in time, prizes came to be offered for competition. This led to the formal institution of shows in which although called F. S., fruits and vegetables are also exhibited. Fortnightly exhibitions are held throughout the year at the Society's Hall, Vincent Square, Westminster, and the following special shows are held each year:—National Auricula and Primula Society's Show, April; National Tulip Society's Show, May; Flower Show, Inner Temple Gardens, May 23 to 25; Great Summer Show at Olympia, July 4 to 6; National Carnation and Picotee Society's Show, July; National Rose Society's Autumn Show, Sept. These shows help to make known plants newly introduced into England and those which are the result of cross-fertilisation, hybridisation, etc. Following the foundation of the London Horticultural Society, many other societies came into being, including many local ones in towns and villages. The most important national society of this description is the Royal Caledonian Horticultural Society founded in 1809. Its F. S., which are its chief feature, are held in Edinburgh in April and Sept., and are open to the whole of the United Kingdom and Ireland.

Flowers, in chemistry, substances which are sublimated as the result of chemical action. The chief are 'flowers of sulphur,' the fine powder which is obtained when crude sulphur is heated to vaporisation and condensed in a cooling chamber; 'flowers of phosphorus,' a flocculent powder consisting of phosphorus pentoxide, formed when phosphorus is burned in excess of air or oxygen; 'flowers of tin' (*flores stanni*), a mixture of powdered metal and stannic oxide formed by fusing the metal in excess of air; flowers of zinc, antimony, arsenic, etc.

Flowers, Artificial, imitations of

natural flowers used for various purposes of ornamentation, including millinery, dresses, and decorations in the house. The Fr. make most of these A. F., though some are made in England and other countries. The materials most commonly employed are sarcenet, cambric, velvet, gauze, threads, and wire, and in some cases paper. The petals and sepals are first stamped out and then gauffered, the same process being pursued with regard to the leaves, which are made of green taffeta, the stems being made of wire. The flowers made for tombs are of pottery or enamelled iron, and sometimes of wax. The Chinese make A. F. from rice-paper, and in the Bahama Islands they are made of shells.

Flowers, Florists', are plants with horticultural varieties, whose parent species are unknown or not cultivated, as the dahlia or gladiolus. Dahlias have only been introduced into England in comparatively modern times, but their beautiful colours, and the fact that they are easily grown and require no especially rich soil, has made them very popular. (*Gladiolus*, a genus of the order Iridaceæ, bears brilliant flowers, blossoming in mid-summer. In America F. F. is the term applied to any flowers raised to be cut for ornamental purposes, as rose, carnation, violet. They are brought to a high state of perfection, and elaborate establishments are maintained for their rearing, transportation, and disposal, giving employment to thousands of people, the increase of wealth in the cities being responsible for their demand.

Flowers, Language of. A special significance is attached to flowers, in that they are used to represent various ideas and sentiments. A consistent and well-understood symbolism has gathered around them, which the Orientals especially have developed into a perfect vehicle for communicating expressions of all degrees of warmth. The use of flowers was full of significance among the Egs. and Roms., and the study was revived during the Middle Ages in Europe, when it became especially appropriate in connection with the age of chivalry.

Our own floral symbolism is far more simple and truly poetical than that of the Orientals, and we can call to mind what the simplest of our flowers revealed to the eye of Wordsworth.

Certain flowers have a common significance among European nations. Thus the rose is the emblem of beauty; the lily, of purity; the violet, of modesty; the daisy, of innocence; the pansy, of thought, and so on; whilst the laurel has long

been accepted everywhere as the symbol of glory, and the oak, of patriotism. Consult John Ingram's *Flora Symbolica*, 1868 (a work which contains also floral poetry, original and selected).

Fludd (Flud, or Floid), **Robert** (1574-1637), Eng. physician, Rosicrucian and mystic philosopher, of Kent. He entered St. John's College, Oxford, 1591, then spent five years studying on the Continent, taking his medical degree at Oxford, 1605. He was a follower of Paracelsus, and tried to form a philosophic system based on his teachings. F. was author of many obscure Latin works, theosophical, philosophical, and mathematical. His works include: *Apologia Compendiaria Fraternalitatem de Rosea Cruce Afluens*, 1616; *Veritatis Proscenium* (a reply to Kepler), 1621; *Philosophia Sacra et Vere Christiana*, 1629; *Summum Bonorum* (reply to Mersenne), 1629; *Clavis Philosophiæ et Alchymiciæ Fluidiæ*, 1633; *Dr. Fludd's Answer unto M. Foster* . . . , 1631; *Integrum Morborum Mysterium*, 1631; *Philosophia Moysaica*, 1638 (Eng. ed. 1658). See Fuller's *Worthies*, p. 1672; Webster's *Displaying of Supposed Witchcraft*, 1677; De Quincey, *Works*, xvi. p. 406; Waite, *The Real History of the Rosicrucians*, 1887.

Flügel, Otto (1842-1914), Ger. philosopher; b. June 16, at Lützen; son of the burgomaster. Pastor, 1871. Co-editor, *Zeitschrift für exakte Philosophie*, from 1873; of *Zeitschrift für Philosophie und Pädagogik*, from 1894. After Kehrbach's death, continued issue of Herbart's works. Wrote: *Das Ich und die sittlichen Ideen im Leben der Völker*, 1885; *Die Bedeutung der Metaphysik Herbarts für die Gegenwart*, 1902; *Herbarts Leben und Lehre*, 1907. Died at Dölau by Halle, July 9.

Fluid, the name given generally to substances devoid of rigidity. Gases and liquids are included in the term, since these bodies offer no sensible resistance to change of form, though they resist compression. Thus, when a F. is acted upon by any distorting combination of forces, it *flows*. Hydrodynamics is the name of the branch of applied mathematics which deals with the motion and equilibrium of Fs. The word 'F.' is figuratively applied to things which are not in reality such. For example, we speak of electric F. in the sense of electricity, whose general properties and motions are known to conform to certain differential equations which the motions and properties of true Fs. strongly suggest. The best writers, however, avoid this figurative use of the word as far as possible nowadays,

for it dates from the time when electricity, magnetism, etc., were actually believed to be due to Fs., which were supposed to have a real objective existence. All Fs. are elastic, but liquids are highly incompressible, whereas gases can easily be compressed. There is more or less frictional resistance to the molecular motions in every F. It is somewhat difficult to draw a sharp distinction between the solid and the liquid state. A great deal depends upon external circumstances, such as the intensity of gravity and temperature. Some substances, when exposed to long continued gentle stress, flow like viscoliquids, whereas they would splinter if subjected to sudden intense stress.

Fluke, see LIVER-FLUKE and TREMATODES.

Fluoboric Acid Gas, a pungent, soluble gas obtained by heating a mixture of boron trioxide and fluor-spar with concentrated sulphuric acid. It does not attack glass, but has a great affinity for water and rapidly chars many organic substances. It combines readily with ammonia gas, forming various compounds according to the relative proportions of the two gases.

Fluorescein ($C_{20}H_{12}O_6$, i.e. $CO < C_6H_4 > C < C_6H_4(OH) > O$. 1:4:6),

a chemical product or dye obtained by heating phthalic anhydride with resorcin at 200° till the mass becomes viscid. It is a reddish or yellow-brown powder, dissolving in water or an alkali to form a solution with a beautiful green fluorescence. It is little used itself for dyeing purposes, as the colours are not fast, but eosins are derived from it, and rival safflower and saffronin for rose-red dyes. Cf. PHTHALIC ACID. See Watt's *Dict. Chem.*, ii.

Fluorescence, an optical property possessed by certain substances whereby rays of light are capable of undergoing a change of refrangibility. When light falls on sulphate of quinine, for example, the liquid exhibits a bluish colour, which is continued some distance below the surface. The light which passes through the liquid is incapable of producing the same effect on another quantity of the substance, so that it appears that light of certain qualities has been absorbed to produce the F. The phenomenon was first described by Sir D. Brewster in 1833, was investigated by Sir John Herschel, and later by Sir G. G. Stokes, who contributed most of the knowledge available at the present day. If a beam of sunlight is focussed on a solution of quinine sulphate by means of a lens of long focus, a blue

cone of light is formed and can be plainly followed by the eye through the liquid, though the intensity of the light rapidly diminishes as it recedes from the surface. In order to discover what rays are responsible for the blue light, a test-tube containing quinine sulphate may be passed through the different parts of the spectrum. No change is observed when the tube is held in the red, orange, and yellow, that is, in the less refrangible rays, but as it approaches the violet, rays of a blue colour proceed, and this continues beyond the visible spectrum into the ultra-violet rays. The general effect then appears to be that the fluorescent substance performs some kind of absorption upon the more refrangible rays and transforms them into rays of longer wave-length. Among fluorescent substances may be mentioned fluor-spar, chlorophyll, esculin, uranium glass, tincture of turmeric, paraffin oil, barium platinocyanide, magnesium platinocyanide, and fluorescein. See Sir G. G. Stokes, *Mathematical and Physical Papers* (vols. iii. and iv.); R. W. Wood, *Physical Optics*, 1905.

Fluoric Acid, see HYDROFLUORIC ACID.

Fluorine, a chemical element of the halogen group, atomic weight 19, atomic number 9. It is an extremely active gas, combining readily with most chemical elements. It was isolated in 1836 by Moissan, who obtained it by electrolysis of liquid hydrofluoric acid free from water. As hydrofluoric acid is itself a non-conductor of electricity, the addition of a quantity of potassium hydrogen fluoride was necessary to convey the current. The electrolysis was carried out in a U-tube made of an alloy of iridium and platinum, this substance being less readily acted upon than other metals. The electrodes were made of the same material, and the products of electrolysis were carried off by lateral tubes, the entrances to the U-tube being stoppered with fluor-spar. As an additional precaution, a temperature of -23° C. was maintained during the operation, this being done by surrounding the tubes by the vapour from boiling methyl chloride. The object of this cooling is to condense any hydrofluoric acid gas present. F. is a pale yellow gas with an irritating smell. It condenses at -187° C. to a yellow liquid, and forms a light yellow solid at -233° C., whilst at -252° C. it becomes white. It is the most active element known, decomposing water readily, and liberating appreciable quantities of ozone. It combines violently with non-metals such as

bromine, iodine, carbon, sulphur, silicon, phosphorus, arsenic, etc., frequently causing them to burn with incandescence; it readily attacks mercury, sodium, potassium, magnesium and other metals, and is only unaffected by oxygen, nitrogen, and chlorine. Curiously enough, the gas can be kept over mercury if it is not shaken, but this is due to the formation of a layer of fluoride which protects the metal from further attack. The only compound of F. with hydrogen is *hydrofluoric acid*, prepared commercially by heating fluor-spar with sulphuric acid in leaden vessels. It is a colourless liquid boiling at 19° C.; its vapour is extremely poisonous, and it combines readily with many metals, forming fluorides. Its most useful property is that demonstrated by its action on glass; it attacks the silica, and may thus be used for etching glass. When the materials are dry, no action takes place. F. is found in nature in fluor-spar (CaF_2), cryolite and other minerals, and traces are found in sea-water and in the enamel of teeth.

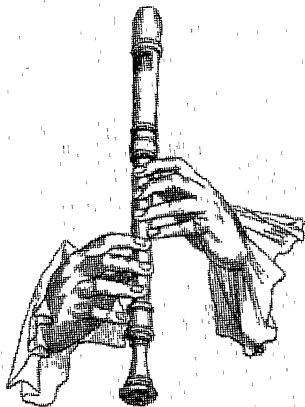
Fluorspar, or Fluorite, a mineral mainly consisting of calcium fluoride (CaF_2). It occurs crystallised in the cubic system and in the massive form. The crystals have a perfect cleavage, a hardness of 4, specific gravity 3.2, and occur in a wide range of colours from transparent to almost black. It often contains calcium chloride and traces of organic matter. Many crystals contain an internal cavity, which is found to contain liquid or gas. The colour, too, is attributed to organic matter, as when the mineral is heated the colour tends to disappear and small quantities of carbon monoxide, hydrogen, etc., are evolved. Some varieties exhibit the phenomenon of fluorescence (q.v.), and phosphorescence is observed when the mineral is submitted to Röntgen rays. F. occurs in association with ores of tin, lead, copper, and silver, and also in cavities in volcanic rocks. It is of wide distribution, and is common in England, particularly in Cornwall, Devon, Derbyshire, and Cumberland. In mining districts F. is used as a flux for copper, lead, and gold ores. The violet variety, known as 'Blue John' in Derbyshire, is made into ornaments. The mineral was highly prized by the ancients for this purpose, but the spar is too soft for personal ornaments. F. is the chief source in the manufacture of commercial hydrofluoric acid, used for etching glass. The transparent variety is used in the construction of optical instruments.

Flushing (Dutch, *Vlissingen*), a strong fortress and seaport in the prov. of Zealand, Netherlands, on the S. coast of the island of Walcheren, at the mouth of the W. Scheldt. It was once an important naval station, but is now a leading port of commerce, carrying on an extensive trade with England, Java, and S. America, the tonnage cleared at the port averaging 400,000. The tn. has grown in favour as a summer resort. It has a royal dockyard, and since 1875 a large floating dock. It is proposed to strengthen the forts of the W. Scheldt by constructing new works at F. The chief industries are shipbuilding, brewing and the manufacture of oil and soap. Exports agricultural produce and shrimps. Pop. (1927) 21,742.

Flushing and Flushing Bay was once a vil. of Queens co., New York, U.S.A., but since 1897 has been part of the borough of Queens, New York City. It is situated on Long Is., at the head of Flushing Bay, and is named after early Nonconformist settlers from Flushing in Holland.

Flute, a musical wind instrument consisting of a long tube of wood or sometimes metal, in several detachable joints and open at the lower end. The vibration of the air in the tube is caused by blowing into the upper end through an oval-shaped hole in the side. The different intervals in the pitch are obtained by closing or opening the different finger-holes in the lower part of the tube, by which the vibrating column of air is lengthened or shortened as desired. The flute in general use possesses a workable compass of about three octaves from the low C in the treble clef with all the chromatic intervals. There are six finger-holes in the lower part of the tube arranged at fixed intervals from each other in order to produce all the notes which form a major scale; the second octave is obtained by blowing with increased force which raises each note to an octave higher, and the third octave can be added by a system of cross-fingering. When chromatic intervals are desired the instrument must have additional finger-holes which are manipulated by means of keys. Cocoa-wood is the material from which the majority of Fs. are constructed, but gold, silver, and other metals are sometimes used. The F. has been in use from the earliest times. Olympus the Phrygian has been credited with the introduction of F.-playing into Greece, where it was largely used in religious ceremonies and encouraged by means of competitive trials of skill. The old English F., called the 'flûte à bec,' from its supposed resemblance to the

beak of a bird, was played from the upper end of the tube, had seven finger-holes and was made in various sizes, called treble, tenor, alto, and bass Fs. respectively. The 'German' F. (*flauto traverso*) gradually superseded the 'flûte à bec' from its invention about 1720. Handel was one of the earliest composers to introduce the 'German' F. into the orchestra, employing it for some of the solos in *The Ode on St. Cecilia's Day* (1739).



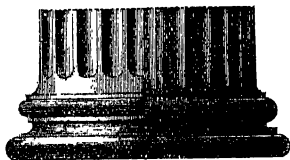
THE 'FLÛTE-A-BEC'

The F. of Handel's day, however, owing to the arrangement of the finger-holes and the difficulty of manipulating the fingering, could only be played in tune in certain keys; this difficulty was abolished by Boehm about 1834, when he introduced the cylindrical bore and a new system of fingering in place of the old conical bore. Boehm's instrument is in tune in practically all keys and is now the one generally used. F. solos are less common than they were formerly, but the instrument still plays an important part in orchestras, where the F. part is generally placed at the top and is written in the violin or G. clef. Other varieties of the F. are the 'fife,' simply an octave F. in D much used in military bands; the 'flageolet,' a smaller variety of the old 'flûte à bec,' the 'piccolo,' an octave F., and the 'flute d'amour,' a minor third below the ordinary F. The old varieties of the 'recorder,' the 'cornet,' and the 'pilgrim's staff' are now obsolete. Among the foundation stops of most organs there are generally one or more

'F.' stops. See FIFE, FLAGEOLET, PICCOLO, also Rockstro's *Construction, History, and Practice of the Flute*, 1890, and Wetzger's *Die Flöte*, 1906.

Flute-stop, an organ stop of the diapason species and so called because its tone resembles closely that of a flute. The Bell Diapason, as it is often called in Britain, is the Flûte à Pavillon, a stop of French invention, and is characterised by its peculiarly powerful tone.

Fluting, in architecture, the channel mouldings cut vertically on the surface of the shaft of a column. In Doric columns the flutes round the shaft are twenty in number and meet with a sharp edge. They are carried



FLUTING
(Corinthian)

up above the necking and end abruptly at the base of the cap. In the other orders, the flutes are twenty-four in number, and are separated one from the other by small fillets. The flutes each terminate in a semicircle at top and bottom. Sometimes, in order to strengthen the columns, the flutes are cabled, that is to say, they are filled in with a bead for about a third of the length of the shaft from the base. In Romanesque architecture many decorated Fs. appear, in which the flutes are curved, zig-zag, or wreathed.

Flux (from Lat. *fluere*, to flow), a substance used to aid in separating metals from the other constituents of their ores. The action may be either the removal of silica or other earthy matter by promoting fusion, or actual combination with the oxygen, sulphur, etc., in the compound from which the pure metal is to be extracted. 'Black F.' is a reducing F., that is, it extracts oxygen from the ore. It consists of a mixture of finely-divided carbon and potassium carbonate, and is made by heating crude cream of tartar with about half its weight of nitre. 'White F.' is a mixture of carbonates of soda and potash. Other fluxes are lime, borax, silica, calcium sulphate, fluor-spar, and red lead.

Fluxions, a method of mathematical computation devised by Sir Isaac Newton. The method was used by Newton for some time before he dis-

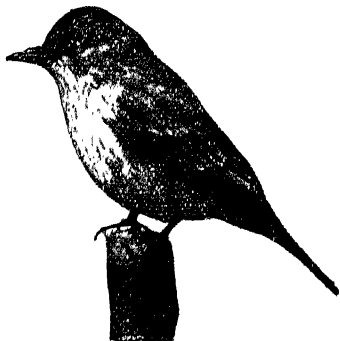
closed its principles to the world in 1693. For some years the system was used by English mathematicians, but was gradually abandoned in favour of Leibnitz's notation. Leibnitz looked upon quantities as made up of very small parts, as the circumference of a circle may be represented as a polygon of an infinite number of sides. Newton, on the other hand, represented such a line as the effect of the continuous motion of a point the velocity of which in equal intervals of time measures the magnitude of the quantity. The method of F. was fully treated in the *Treatise on Fluxions* of Colin Maclaurin, published in 1742.

Fly, see DIPTERA; HOUSE FLY.

Fly, Artificial, see ANGLING.

Fly-blister, see CANTHARIDÆ.

Fly-catcher, the name of a Passerine family of *Muscicapide*, but it is used in a wider sense generally to describe all birds who catch flies on the wing.



SPOTTED FLY-CATCHER

There are over 40 genera and 280 species. The Fs. are small-sized, bright-plumaged birds, and abound in warmer parts of the Old World and in Australia. They are not found at all in N. and S. America. The bill is a distinctive feature; it is strong and short, and has bristles on the broad, flat base. The common British F., *Muscapa grisola*, is a tiny brownish-grey bird. The beautiful paradise F. of the E. Indies and the 'grinder' of Australia do not belong to the genus *Muscapide*.

Fly-fishing is the sport of catching fish by use of an artificial fly as bait. It is rightly considered to be the most fascinating branch of angling, and great ingenuity has been bestowed upon the manufacture of the various

flies used for the purpose. Not only has the angler to choose a fly closely resembling in colour and shape the flies dancing over the stream at the time, but he must also cast the bait in such a way as to preserve the appearance of life. F. is principally used for the salmon, trout, and grayling. Sometimes three or four flies are cast together upon the water and drawn below the surface somewhat at random, while another method is to select a particular fish and cast a fly a short distance up-stream, allowing it to float down over the fish's head. The sport requires considerable dexterity and has innumerable devotees. See Francis Francis's *Book on Angling* (6th ed.), 1885; Dewar's *Book of the Dry Fly*, 1897; Sir E. Grey's (Lord Grey of Fallodon) *Fly-fishing*, 1899.

Flying, or Flight, is the act of moving through the air by propulsion given by wings. In the strict sense of the term the power of flight is only possessed by certain insects, birds, and bats, the latter including the so-called flying-fox. There are other animals which modify their progression through the air by various means which give their actions a certain similarity to actual flight, and they are therefore loosely termed flying animals. It is uncertain to what extent the extinct reptiles (ptero-dactyls, pterosaurs, rhamphorhynchus) were actually capable of flight, but they certainly possessed wings very similar to the modern bat. The so-called flying fish (*Exocoetus* and *Dactylopterus*) give themselves an initial impulse by means of a powerful spring effected by their muscular tails; and use their pectoral fins after the manner of a parachute, being thereby able to sustain themselves for some hundreds of feet in the air. The action of the fin, however, can hardly be said to be analogous to that of the wing in birds. Certain species of lizards, as, for example, the *Draco volans*, have a skin formation attached to their ribs, which are peculiarly elongated, in such a way as to form a kind of kite, and this enables them to make short darts through the air. The flying opossums or flying phalangers, a genus of small arboreal marsupials found in Australia, have a fold of skin along the flanks which, serving as a parachute, allows them to make prolonged leaps with considerable agility and grace. A smaller member of the same species is known as the flying mouse. There are also two genera of squirrels (*Pteromys* and *Sciuropterus*) which have a development of the skin between the fore and hind legs and possess the power of making leaps for great distances through the air. In doing so they also make use of their

tail, the hairs of which stand out on either side and serve to some extent as feathers for supporting them, while the tail also aids to direct their flight. The parachute action exhibited by the animals mentioned above is developed to a greater extent in the flying lemur (*Galeopithecus*), an insectivorous animal in whom the hairy fold of the skin reaches from the throat to the end of the tail and includes the whole length of both fore and hind legs up to the claws. These animals can leap a distance of over 200 ft., and are found in the Indian Archipelago. Zoologically it is difficult to say whether the flying lemurs should be classed with lemurs, bats, or insectivores, but the latter is the usual method of classification adopted. There is also a kind of squid or cuttlefish known as the flying squid, having broad lateral fins, which enable it to spring high out of the water.

For further information on the subject the reader is referred to Pettigrew's *Animal Locomotion*, 1882; Maybridge's *Animal Locomotion*, 1887; G. Barrett-Hamilton's paper on 'Flying Fish' in *Annals and Mag. of Nat. Hist.* (vol. xi.), 1903; and for the flight of birds to F. W. Headley's *Structure and Life of Birds*, 1895; Strasser's *Ueber den Flug der Vögel*, 1885; and to the articles on BAT, BIRD, DRAGON, FLYING-FISH, INSECT, OPOSSUM, PTERODACTYL, SQUIRREL. For flying machines see article on AERONAUTICS.

Flying Bridge, see FERRY.

Flying Dutchman, the name given to a spectre ship, supposed by popular belief to haunt the waters round the Cape of Good Hope. According to the legend, the captain of the vessel, Vanderdecken, was condemned for his blasphemy to sail for ever round the Cape in a special ship, always unable to 'make' a port. Sailors consider the appearance of the *Flying Dutchman* a bad omen and quickly change their course to avoid it. The legend has several variants in many tales of German mythology, and its prototype is likewise current in other countries. According to Sir Walter Scott, the vessel was originally laden with bullion, a murder was committed on board, and plague broke out. Wagner's opera, *Der fliegende Holländer*, is based on this legend.

Flying-fish are of two species, the *Exocoetus* and the *Dactylopterus*. They are bony, and can travel some distance in the air above the water. Of the *Exocoetus*, or flying herring, there are forty known species, mostly in warmer seas. A few are seen in British waters and in the Mediterranean. The long pectoral fins are

the distinguishing feature. The length of the body is about one foot.

Flying Lemur, an insectivorous mammal with a parachute provided with special muscles, very efficient for flying. It can sweep for a distance of 70 yds. The claws are for climbing, and the colour is that of mottled bark. It is about 20 in. long, and inhabits the Indian Archipelago.

Flying Machines, see AERONAUTICS.

Flying Squirrel, a member of the squirrel group of rodent animals, having a parachute-like expansion of the skin of the flanks, partly supported by bony processes of the feet, which enable it to take extraordinary leaps, gliding for a great distance through the air. There are two widely distributed genera, the *Pteromys*, including the larger, and the *Sauropterus*, the smaller species. The former are characteristic of the Indian and E. Indian region, the latter of N. America, Asia, and Europe. The European species is about the size of a rat, of a greyish-ash colour, with a short tail, and it lives in the forests. Its fur is of little value. The N. American species, on the contrary, is a good deal larger, and its tail is as long as its whole body. In general appearance *F. Ss.* resemble ordinary ones, and their habits, food, etc., are much the same. They are rarely seen except at night.

Fly River, in New Guinea, rising in the N.W. corner of the British part of the island and flowing into the Gulf of Papua by a wide delta. MacFarlane and D'Albertis ascended it 90 m. in 1875, and in 1885 Captain Everill explored it for 200 m. Its banks are densely wooded.

Flysch, a remarkably thick mass of sandstones and shales extending very continuously from the Southern Alps to the Vienna basin, and then round the Carpathians into the Balkan peninsula. Although uniform in character, it is not of the same age in every place, and probably extends from the Lower Cretaceous period to the Tertiary. It consists in all probability of debris washed down the sides of the hills over a long period. Nowhere are fossils abundant except in the Oligocene bed of Glarus. Similar formations to the *F.* are found in the Pyrenees, the Apennines, the Caucasus, and in the Siwalik beds of the Himalayas. According to locality the *F.* is variously known as Vienna sandstone, Carpathian sandstone, Macigno, Red *F.*, Wild *F.*, etc.

Fly-trap, see *DRONÆA MUSCIPULA*.

Fly-wheel, a wheel of large diameter and heavy rim connected with the driving-shaft of an engine in order to equalise the motion. Where the motion of an engine proceeds from

the to-and-fro movement of a piston-rod impelled by the expansive power of steam, it is evident that the velocity decreases towards the end of the stroke when the piston and crank are approaching the same straight line. The moving parts of the engine thus tend to proceed in jerks. The function of a *F.* is to receive the excess of energy when the impulse is great, thus retarding the motion of the engine, and to aid the engine when the impulse is less than the mean. In other words, by virtue of its turning-power when in motion, it acts as a reservoir of energy by which intermittent impulses are made uniform, or by which intermittent demands on the energy may be spread over a longer period. It is thus used in two sets of circumstances: (1) When the engine is moved by force applied in successive strokes, as in a single acting steam engine, a gas engine, a treadle lathe, etc.; (2) when the work which the engine is called upon to perform consists of intermittent strokes, as in punching machines, etc. For effective working the *F.* should be placed near the seat of intermittent motion; thus, a punching machine driven by gas should have a *F.* on the crank-shaft to regularise the motion of the gas engine, and another on the punching mechanism to store the energy to be given out in successive punches.

F.O.B., an abbreviation for 'free on board,' used in contracts for the sale of goods to denote that costs of carriage and delivery of the goods on board ship must be paid by the seller.

Foch, Ferdinand (1851-1929), Fr. general, b. at Tarbes and of old Pyrenean descent. Educated at Metz, and was here when the Franco-Prussian War broke out, and during that war was posted to an infantry regiment. Entered the Artillery school and passed out with distinction as a gunner officer. He was a lieutenant in 1875 and captain in 1878, after a course at the Ecole Polytechnique, Paris. In 1885 he entered the Staff College, and in 1895 became instructor in military history, strategy and applied tactics at the college. His lectures, which are republished in his *Principles of War*, were at once recognised as being of sterling merit in their earnest and profound analysis of the elements and conditions that had brought success to the Ger. arms in 1870-71 and success to Fr. arms in the forty years prior to the Battle of Waterloo. He was known before the war as author of a number of standard books on tactics and strategy, and was recognised by military students as one of the leaders of a brilliant group of Fr. officers

whose teaching, inspired by the theories and practice of Napoleon, was the most striking evidence of the renaissance of the Fr. army. He was promoted, Lieut.-Colonel in 1898, Colonel in 1903, and General Commanding 13th Infantry Division in 1907. In the Great War he served on the Western Front, becoming a Marshal of France in 1918 and Generalissimo of the whole of the British, Fr. and American forces in France and Flanders. From the very first days of the campaign F., who in 1914 was a corps commander, established his reputation as one of the most brilliant of the Allied leaders, and it is perhaps not a little surprising that his wonderful achievement at the head of the 9th Army in the fighting in the St. Gond Marshes in the 1914 Battle of the Marne was not at once productive of a more dramatic promotion. Yet such are the currents of Fr. military circles that recognition of his supreme genius came comparatively slowly. Indeed, as M. Clemenceau observed at the Fr. Embassy on his visit to England just after the Armistice, the great Field-Marshal was even unemployed for the space of a fortnight during a critical period of the operations. At the Marne battle he played a most prominent part in arresting the onward rush of the Ger. armies and saving the capital from the invader. He was in command of the Fr. centre between Sézanne and Mailly, and for three days he was compelled, against the repeated efforts of the Gers. to pierce his line, to retire. Yet promptly in the succeeding days he renewed the offensive with a stubbornness which was characteristic of his whole nature, and at last, having drawn the enemy over further into the marshes, he took him in flank and hurled him back over the river. He again signally distinguished himself in 1915 during the first battle of Ypres, his aid being invoked by Field-Marshal Sir John French (later, Earl Ypres) when the Gers. launched their first gas attack. The British Field-Marshal's dispatches record his gratitude for the valuable support lent by General Foch on this occasion and indeed for his organisation of operations in Flanders generally at about this time. In the great Somme offensive begun by the British in the middle of 1916 the co-operation of the Fr. armies was under the direction of General Foch. Finally in the darkest days of 1918 when it became apparent to everyone that the success of the enemy armies in Europe generally was largely due to unity of command among Ger. headquarters, it was agreed by the Allies to co-ordinate the action of

the Allied armies on the Western front under General F. The decision was taken in April 1918, and from the turning point of the last Ger. rush, namely in the middle of July at the second battle of the Marne, the Fr. Marshal, by a series of remarkable actions along the entire front, gradually 'rolled up' the Ger. armies and forced them to sue for an armistice.

As a mark of appreciation Marshal F. was made a Field-Marshal of Great Britain and awarded the Order of Merit. His chief publications are *The Principles of War* and *The Conduct of War*. In these it is clear that his model is Napoleon, and that after earnest and searching



[Topical Press

MARSHAL FOCH

examination he rejected the Ger., and particularly Von Moltke's, system in principle and endeavoured to restore principles which were more in keeping with the genius and traditions not only of the Fr. army, but of the Fr. nation as a whole. That which in the Ger. school is so contrary to the Gallic spirit is the *a priori* method of reasoning—the logical deductions from premises most laboriously conceived and taken thereafter as admitting of no sort of variation. What was 'according to plan' or 'according to programme' could not, in the eye of the Ger. staff-officer, be wrong. This view, logical enough so far as it goes, implied that the art of warfare had finally become superseded by the science of organisation. F. stoutly refutes this supersession, and, while recognising the value of organisation, keeps it always subordinate to strategy, and by his own victories gives practical

proof that organisation is not an end, but a means to an end. The strategy of F. inspires confidence from the fact that his own guiding maxim is that 'to hold positions is to prepare implicitly for defeat, if nothing further is attempted, if the offensive is not immediately assumed.' Again, the Ger. Staff's system took no account of the factor of human nature in warfare in providing for all contingencies. F. saw that, however accomplished von Moltke was as a Staff officer, he was not a great leader of men, and he was not a great leader of men because he was a slave to his plans and because these plans were based on a system which ignores the human element in the vain hope of perfecting a machine. In his professional capacity at the *École Supérieure de la Guerre* F. was before 1914 a master of the science of war. His marvellous success was therefore the practical application of sound principles of strategy combined with an absolute mastery of technique. Added to these acquired qualities were his naturally quick perception and genius for co-ordination and a faculty for envisaging almost any situation in a broad and comprehensive manner. Whatever the circumstances in the war, he seemed ever able, with his great gifts as a technical expert and a soldier and his peculiar quality of 'calculated tenacity,' to meet each new move of the enemy with new dispositions nicely adjusted to the precise needs of the situation. Physically Marshal F. was a man of middle height, with deep bass voice, grey-blue eyes, and typical Fr. military moustache. He was a man of few words, and when speaking in public was precise and logical, staccato in utterance, and essentially mathematical in expression and point of view. In 1919 his face appeared lined and worn, a fact which gave the greater prominence to his massive head, while at the same time accentuating the necessary consequences of years of heavy responsibilities superadded to a physical constitution by no means strong. Consult *The Memoirs of Marshal Foch*, translated by T. B. Mott, 1931.

Fochabers, a vil. of Elginshire, Scotland, situated on a height overlooking the R. Spey, 8 m. S.E. of Elgin. Gordon Castle is near by, and in the village is a handsome public educational building which was erected by Alexander Mylne, who was a native of the parish. Pop. 972.

Focsani, or **Fokshani**, a tn. of Rumania and cap. of the dist. of Putna. It is situated on the Milcov, 125 in. N.E. of Bucharest, and it is an im-

portant commercial centre, having a river trade with Galatz. There are soap and oil factories, tanning works, and a trade in wine and grain. The Turks were defeated here in 1789 by the Austrian and Russian allies. Pop. 25,300.

Focus (from Lat. *focus*, a hearth), a point to which converging rays are directed or from which rays diverge. When rays of sunlight, which may be taken as parallel, are received upon a concave mirror, they are all reflected to a certain small area in which any object will appear to be intensely illuminated; the geometrical point corresponding to that area is called the F. of the mirror. If light is received upon a convex mirror the reflected rays are scattered, but their direction may be followed backwards to a point behind the mirror, which is therefore called the 'virtual' F. When parallel rays are made to converge by means of a lens, the point where they meet is called the F. of the lens, and it is at this point, or near it, that sun's rays may be made to ignite paper, wood, etc. In geometry, a F. is a point which has some definite relationship to the points on a continuous curve. Thus the F. of a parabola is a point the same distance from a point on the curve as the latter is from a fixed straight line. An ellipse is a curve whose distance from a fixed point called the F. bears a constant ratio, less than unity, to its distance from a fixed straight line. There are two such foci, except in the case of a circle, where the centre is the F. In estimating the propagation of earthquake shocks, the F. is that point from which the earth-waves diverge in all directions; frequently there are two such foci.

Fœtus, the embryo in its later stages of development, when it is recognisable as belonging to the species of its parents. In the first week of fertilisation, the human ovum passes into the cavity of the uterus, in two weeks it is about $\frac{1}{2}$ in. long and $\frac{1}{4}$ in. broad, and the folds which ultimately determine the head and the caudal region are developed. By the fourth week the embryo is curved upon itself, the rudiments of the ear appear as small nodules, and oval buds indicate the coming of limbs. The eye is recognisable in the fifth week, and the main segments of the limbs are defined. At eight weeks the F. has a distinctly human appearance, the nose is prominent, the fingers are separate, and the tail becomes reduced to a rudiment; the length of the F., excluding the legs, which are small and curved inwards, is about $1\frac{1}{2}$ in. In the third month the

limbs assume more definite proportions, nails appear on the fingers and toes, and sex can be distinguished. In the fourth month hairs are developed, and the hind limbs gain in proportion to the fore limbs; the F. is from 6 to 8 in. long, and may live for a few hours if born at this time. In the sixth month the length has increased to about 12 in.; eyelashes and eyebrows appear. In the seventh month the body is plumper, the eyelids open and the F. is capable of living if born. In the eighth and ninth months, the body increases in size and plumpness, the colour takes on a rosy flesh tint. At the end of the ninth month, when the F. is born, it should measure about 20 in. in length, and should weigh from $6\frac{1}{2}$ to $7\frac{1}{2}$ lb. In its foetal stage the embryo is of course dependent upon the maternal blood supply for nutriment. The organ of nutrition is the placenta, in which an interchange of products of the maternal and foetal circulation takes place. The connection between the F. and the placenta is the umbilical cord, which after birth becomes atrophied.

Fog, or Mist, a condition of the atmosphere produced in several different ways. It is due to the condensation of aqueous vapour which is always present in the air and begins to condense when the point of saturation is arrived at. Such a point is reached sooner in air at a low than at a high temperature, hence Fs. are often produced by the sudden cooling of air, owing to its meeting another current at a lower temperature. For the same reason morning mists disappear as the sun's heat increases. Vapour is more readily condensed if there be something which affords a nucleus for such condensation, so that the presence of dust particles is sufficient to produce F., even in non-saturated atmospheres. The density of the F. or mist produced depends upon the amount of aqueous vapour in the atmosphere, the temperature and pressure, and the number and size of dust particles. A cloud is simply a mist formed high up above the earth's surface. If the drops of condensed vapour are sufficiently large, they fall as rain. The thick, opaque Fs. prevalent in large cities, and especially in London, are due to the large number of carbon particles floating in the air. A F. will arise where a warm, damp current of air passes over a cold surface. This phenomenon is particularly to be noticed in the region of ice floes. The Fs. on the coasts of Nova Scotia and Newfoundland are due to the warm air from the Gulf Stream passing over the colder water from the Arctic

Ocean. On the other hand, mists frequently arise from the contrary cause of cold air passing over warm water. Thus at eventide, or when a sudden fall of temperature sets in, the air cools more quickly than the water, and cannot absorb the vapour given off by the latter, leading to the production of mists so often seen over sheets of water or marshy ground. In London Fs. frequently occur during the winter months, beginning usually in September and reaching their greatest frequency in November, whence they gradually decline until the middle of February, after which a greater falling off takes place, the least foggy month being July. Fs. usually occur on a calm day or when there is a light east wind blowing. The record of London Fs., kept since 1863 shows that the worst F. was that of 1879, which lasted practically from the beginning of November to the following February, December having no fewer than seventeen foggy days. In the year 1873 no less than seventy-four Fs. were recorded. The presence or absence of F. has a great effect upon the death-rate, sufferers from asthma, bronchitis, pneumonia, pleurisy, and other diseases of the lungs, as well as whooping cough, being especially affected thereby. Dense Fs. in great cities are of considerable inconvenience owing to the general or partial suspension of traffic caused, and experiments have been made, notably by Sir Oliver Lodge, to devise means of dispersing them, but none of these methods have been put into actual practice.

Fogazzaro, Antonio (1842-1911), a poet, novelist, and distinguished Liberal Catholic, b. at Vicenza; studied literature and divinity under the Abate Zanella, and law and music at Padua and Turin. With his Wordsworthian simplicity and pathos he was the purest modern Italian writer. He first published a poetic romance, *Miranda*, 1874, followed by *Valsolda*, 1876, which brought him a modest recognition as a poet. Turning to fiction, he produced *Malombra*, 1882, and *Cortis*, 1887, both unworthy of his genius. His next novel, *Misterio del Poeta*, 1888, a unique and beautiful idyl, was his first great success; and this was succeeded by the trilogy *Piccolo Mondo Antico*, 1896; *Piccolo Mondo Moderno*, 1901; and *El Santo*, 1905, to which was ultimately added *Leila*, 1911. F.'s fame rests chiefly on *El Santo*, wherein is expressed the culmination of his theological sympathies with the young Christian democrats and the broad principles of Modernism. This work, translated into several languages as soon as it appeared, and

placed on the Index, caused a greater stir than any other modern European novel save, perhaps, Tolstoy's *War and Peace*.

Fogelburg, Benedict Erland (1786-1854), a Swedish sculptor, *b.* at Gothenburg. His father was a copper-founder. A student in the School of Art at Stockholm, in 1818 a gov. grant enabled him to travel to Paris, where he studied under Pierre Guerin, the sculptor, and Bosio. In 1820 he fulfilled the dream of his life, and went to live and work in Rome. He was recalled to his native country by royal command in 1854, but finding it impossible to live without the natural beauty and antiquity of Italy, he returned to Trieste in the same year, and died there suddenly. His works display independence of thought and wonderful imagination influenced by ancient Gk. art. His statues of Odin, Thor, and Balder at the National Museum at Stockholm, completed in 1845, are strong and beautiful expressions of his art. His portraits of Gustavus Adolphus, 1840, Charles XII., 1851; and of Birger Jarl, the founder of Stockholm, 1853, are full of life and vigour.

Foggia, a tn. of Apulia, Italy, and the cap. of the prov. of F. It is situated in a fertile district, 76 m. N.W. of Bari. The cathedral, dating from 1172, was partially destroyed by an earthquake in 1731 and rebuilt in a different style, though some Norman work still remains. It is on the main line from Bologna and Brindisi, and is an important centre for the market produce of the surrounding district. Pop. of commune (1926) 72,300. The province has an area of 2688 sq. m. Pop. (1921) 458,500.

Foghorn, *see* FOG SIGNALS.

Fogo, one of the Cape Verde Is. It is the highest in the group and has an active volcano, reaching 8800 ft. above the sea. The climate is good, though tornadoes sometimes sweep across its borders. The area is 170 sq. m. Nossa Senhora da Luz is the chief tn. Total pop. about 16,500.

Fog Signals are audible signals used on board ship, on railways, or elsewhere, at times when lights or ordinary signals would be of no avail. The maritime code, first made in 1861 and revised in 1897, is now universal. According to this code, steam vessels under way are to sound a prolonged blast every two minutes upon a steam whistle or siren; if under way, but stationary, two prolonged blasts at the same interval. A sailing vessel under way must sound a foghorn, giving one blast every two minutes

if on starboard tack, two blasts if on port tack, and three blasts when sailing before the wind. When at anchor each vessel is required to ring a bell at intervals of not more than two minutes. F. S. are given on railways by laying small detonating caps upon the lines, which explode as the front wheels of the engine pass over them.

Föhn (Lat. *favonius*), a warm, dry wind blowing down the valleys of the Alps from high central regions, generally in the winter months. It is caused by the expansion of air in the mountains, cooling and thus condensing the vapour, which as it descends to lower levels is dynamically heated, causing warmth and dryness. The F. wind often blows with great violence, and causes much discomfort and strain on the nervous system. Similar local winds occur in many parts of the world, on the W. coast of Greenland, in the Rocky Mountains, Colorado, and New Zealand. This wind is often known as the *sirocco* in the S. Alps, though its nature and cause are not the same as the true *sirocco* wind. *See* Hahn, *Lehrbuch der Meteorologie*, p. 594; and Buchanan, *Atmospheric Temperature during Föhn*.

Föhr, one of the N. Frisian islands in the N. Sea, off the W. coast of Schleswig-Holstein. Wild fowl abound in the autumn, oysters are exported to Hamburg, and fishing is largely carried on. Wyk is the chief town. Area 30 sq. m.; pop. 4500.

Foil, a general name for thin plates or sheets of metal, resembling a leaf in thinness. It is used in chemistry for electrical apparatus, and by jewellers for backing gems of the less precious kind. The latter is sometimes known as 'Dutch F.', consisting of small sheets of silvered copper, rolled very thin. It is coated with a mixture of isinglass and translucent colour, highly polished. 'Tinfoil' is the commonest kind, used for wrapping chocolate, tobacco, etc. 'Gold-F.' is chiefly used by dentists for filling teeth, and is thicker in substance than gold-leaf, which is employed principally for gilding purposes. Gold-leaf is prepared by a prolonged beating-out of the metal between sheets of vellum and thick skin. The leaves can be produced in ten different shades of colour, according to the amount of silver or copper alloy used, and are about 3½ in. square.

Foil, a blunt sword, *see* L'ÉCROING

Foix, cap. of Ariège dept., France, on R. Ariège, at the foot of the Pyrenees, 44 m. S. of Toulouse. It is faced on the W. by a cavernous rock, with three Gothic towers and the ruins of an old castle. Gaston de Foix was born here (1489). There are

iron and steel works and flour mills. Pop. about 6700.

Foix, the title of a distinguished old Fr. family which was famous from the eleventh to the sixteenth centuries, resident in the town of Foix. Count Roger, grandson of the Count of Carcassonne (*d.* 1012), was the first to assume the title of Count of F. He *d.* about 1064. His brother Peter succeeded him, followed by his son Roger II., who distinguished himself in the crusade of 1095; this count was excommunicated by the Pope for seizing Church property. In 1190 Count Raymond-Roger fought in Palestine, and assisted in the capture of Acre, afterwards he fought in the wars of the Albigenses; his estates were seized by the Church on the excuse of heresy and given to Simon de Montfort. He regained them before he died by large bribes to the Church. His grandson, Roger Bernard III., was a better poet than a warrior; he was first made a prisoner by Philip III. of France and then by Peter III. of Aragon; he married the daughter of the Vicomte de Béarn. His great-grandson, Gaston III., was the most famous member of the family (*see below*). Gaston IV. (*d.* 1479) married Leonora, daughter of King John of Aragon and Navarre. His grandson, Francis Phoebus (*d.* 1483), became King of Navarre. His sister Catherine succeeded him (*d.* 1517), having married Jean d'Albret (*d.* 1516). When Henry of Navarre became king (1589), the estates of F. became part of the royal domain of France. Another grandson of Gaston IV. was Gaston de Foix (*d.* 1512), a distinguished soldier; his sister Germaine became the second wife of Ferdinand I., King of Spain. Gaston took the command of the Fr. troops in Italy and died at Ravenna.

Foix, Gaston III., Comte de Foix, and Vicomte de Béarn (1331-91), son of Gaston II. He was surnamed Phoebus, because of his great personal beauty; he also bore a golden sun in his escutcheon on account of this name. He fought for France against England and defended the frontiers of Gascony, but being displeased at King John II.'s preference for the Count of Armagnac he left the Fr. army and went to fight in Prussia. Returning to France in 1358, he rescued the royal princesses from the Jacquerie at Meaux, and at once began war against the Count of Armagnac, whom he defeated and compelled to pay a large ransom. He was appointed governor of Languedoc, and when Charles VI. became king he was recalled, the Duke of Berry being chosen as governor.

Gaston, however, refused to give up Languedoc, and fought for two years, retiring defeated to his own estates. He married Agnes, daughter of Philip, Count of Evreux, and Queen Jeanne II. of Navarre; he divorced her in 1373. Their only child, Gaston, tried to poison his father, and it is probable that his father killed him in 1381. Gaston on his death left his estates to Charles VI. Froissart writes a vivid description of the splendour of Gaston's court, of his delight in beauty, and his love of hunting, and asserts 'that there was none like him, of so fair a form or so well made.'

Fokien, Fuhkien, or Fukien, a maritime prov. in China, bounded on the S.E. by the China Sea, and on the other sides by the provinces of Chekiang, Kiangsi, and Kwangtung. Its area is 46,320 sq. m. The surface is very mountainous, and the province is noted for its beauty, the mountains, clad with timber and shrubs, forming a picturesque background. The principal river is the Minkiang, which enters the sea below Foochow, the capital, which is celebrated for its fruits, and produces a considerable quantity of ginger. The province produces tea, camphor, tobacco, sugar (cultivated in the irrigable country), indigo, and alum, which form its chief exports. The prosperity of Formosa has spelt the decline of F., especially in the tea trade, though there is still a fair trade in flower-scented teas and in camphor production. But there is a good timber industry, the chief woods being fir, rosewood and pine; and paper is manufactured from bamboo pulp. The mineral resources include coal and iron and the precious metals. Clay for the porcelain manufactures of Min ware is also important (*see under CHINA—Chinese Art*). The coast people are engaged in trading and fisheries. The pop. of F. is most uncertain; according to the Gov. gazette it was 8½ millions in 1911, and according to the Chinese post office it was 14½ millions in 1925. F. occupies an important strategic position in relation to Japan, and for that reason the latter country in 1915 induced the Chinese Gov. to sign an agreement whereby China may not allow any foreign nation to construct military coaling stations or naval bases or dockyards on the Foochow coast nor borrow money to effect the same objects herself.

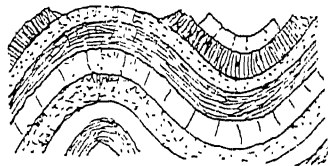
Fokker, Anton Hermann Gerard, Dutch aeroplane-builder, b. April 6, 1890, at Kediri, Java. Educated at Haarlem. Became an aviator at age of 20. International pilot in 1911; in 1912 competed successfully in Russia—also erected a factory at

Johannesthal, Berlin; in 1913, opened another at Schwerin. During the Great War he kept the Gers. supplied with fighting aircraft—his biplanes and triplanes being named after him. In 1919 he liquidated his Ger. affairs and opened business in Holland; in 1924 he became a director of an American airplane company. Has works also in Madrid. Inventor of the means of shooting through the field of a tractor-propeller.

Fokshani (Rumania), see FOCSANI.
Folard, Jean Charles, Chevalier de (1669–1752), a Fr. officer and tactician, served at the battles of Cassano (1705), and Malplaquet (1709). His writings include, *Nouvelles découvertes sur la Guerre*, 1724; *Commentaires sur Polybe*, 1727–30, 1753; *Traité des colonnes et de l'ordre profond*, 1727–30. Napoleon later adopted this column formation recommended by F. See *Mémoires pour servir à l'histoire de la vie de Folard*, 1753; *Esprit du Chevalier de Folard*, 1761, published by Frederick II.

Foleland, or Folkland, see BOCLAND.
Fole-right, or Folkright, the body of customs recognised as law in early Eng. history before the Norman Conquest. The term later became synonymous with 'common law.' See Maitland, *Hist. of Eng. Law*, 1899; Chadwick, *Studies in Anglo-Saxon Institutions*, 1905.

Fold, in geology, a bending or curve in stratified rocks. Curvature of some degree occurs in most strata, but the term is particularly applied to a



OPEN SYMMETRICAL FOLD

Showing an anticline or upward bend and a syncline or downward bend

somewhat sudden inclination to the general direction. Where the strata continue their original direction on a higher level after a single bend, the fold is termed monoclinic; it more often occurs that the strata are doubly bent upwards or downwards, when the folds are called anticlinal or synclinal.

Folengo, Teofilo (1491–1544), an Italian Macaronic poet, b. at Cipada near Mantua. He is also known as Merlino Coccajo, a name under which he wrote. He became a Benedictine

monk, and for some years led a monastic life, during which time he wrote Latin verse. But in 1516 he seems to have grown tired of the monastery, and we find him wandering about the country in company with a lady named Girolama Diedo. His first publication was a romance in verse entitled *Merlino Coccajo macaronicon*; this proved a success and was followed by *Orlandino*, which he published under the name of Linerno Pitocco (Merlin the Beggar) da Mantova. This was in 1526, and he seems then to have tired of his wandering and returned to his monastery, where he wrote an account of his roamings entitled *Chaos del tri per uno*, part prose, part verse, and in a mixture of Latin and Italian. He wrote a life of Christ, *L'Umanità del Figliuolo di Dio*, and many other poems that were not published. Rabelais quotes and even copies him; the early editions of his *Opus macaronicum* are very rare.

Foley, John Henry (1818–74), an Irish sculptor, was b. in Dublin. His first exhibits were his models of 'The Death of Abel' and 'Innocence' in 1839; both these were well received, but his 'Ino and Bacchus' created even a greater stir. It was executed in marble for the Earl of Ellesmere. Some more of his works are: 'The Death of Lear,' 1841; 'Prospero and Miranda,' 1843; 'Contemplation,' 1845; 'The Mourner,' 1849; and 'Caractacus,' 1867. All his works were of a very high order, but his statues and busts were especially noted. His bronze equestrian statue of Lord Hardinge, now in front of the gov. house, Calcutta, is one of the finest works produced in this country. He also executed the statues of Goldsmith and Burke in Trinity College, Dublin, and a symbolical group, 'Asia,' and a statue of the Prince Consort for the Albert Memorial in Hyde Park. His portrait busts are noted for their excellent likenesses.

Folgoré, Giuseppe, an Italian poet, one of numerous writers of sonnets in the thirteenth century. His poems vary very much in their degrees of excellence, but are all more or less humorous and satirical, and typical of the time at which they were written. Rossetti translated them into Eng., and there are also translations by J. A. Symonds. See D. G. Rossetti's *Dante and his Circle*, 1874; and J. A. Symonds' *Italian Literature*, 1881.

Foliation, in geology, a structure characteristic of the gneisses. The different minerals appear in the rock in layers, not continuous, but usually lenticular in form, that is, the bands of quartz or felspar increase in thick-

ness to a maximum and then taper out, while other layers widen out. These bands are very often curved and tortuous; if the lenticular structure is visible to the naked eye, the rock is called a gneiss, if much finer grained it is usually termed a schist. When a gneiss has large elliptical folia of felspar, it is said to be an augen gneiss, from the Ger. *augen*, eyes. F. must be distinguished from the lamination of sedimentary or metamorphosed rocks, which may either be due to the fact of their having been deposited in layers, or, as in slate, to great pressure exerted through the folding of strata.

Foligno, or Fuligno (anct. *Fulgina*), a tn. of Perugia prov., Umbria, Central Italy, 20 m. from Perugia, is situated on the Topino. It is noted for parchment, silks, leather, soap, woollens, and machinery. The earthquakes of 1831-2 did much damage. The cathedral of San Feliziano is the chief public building. F. was once head of a confederacy of Umbrian cities. It is now a bishop's see. Pop. about 27,000.

Folio (ablative of *folium*, leaf, or often an adaptation of It. *foglio*), with reference to pagination, a leaf of paper or parchment of a MS. or book, numbered only on the front, measuring about 17 by 22 in. In bibliography and printing the phrase 'in folio' is used of a sheet folded once to make two leaves, and hence of a book formed of such sheets, a book of the largest size. In book-keeping a folio is the page or two pages (numbered alike) in a ledger on which the creditor and debtor account is entered.

Folk Dancing. The simple, spontaneous and uninstructed dances of people in small towns and country places. The word folk means the common people, and such phrases as folk-lands, folk-lore and folk-dancing are related to the rights, the customs, the habits and life of the ordinary pop. In every country of the world dancing has played its part, and practically everywhere is susceptible of a rough division into two main parts: formal and spontaneous. In its more stately and intentional manner dancing has been surrounded with rigid rules, precise etiquette or social custom, from anct. times when it was part of religious ritual, to the later day of pomp in Court Balls. In its simpler aspect, it has been part of the play of the children in the street and a natural outlet of the spirits of adult merry-makers on the village green. Dancing is now influenced by professionalism and the habit of the professional mind is to adopt the convenient plan of limiting

its definition to a specific style. In the strict language of the dancing instructor, F. D. is not quite the same as Country Dancing, but in a looser and more general use of words the two phrases are interchangeable.

Folkestone, a municipal bor., seaport, and market tn. in Kent, about 6 m. W.S.W. Dover. It has a deep-sea harbour, which was begun in 1881. The shipping entering and leaving was over 800,000 tons for 1927 and 1928. The town lies in a hollow between two high cliffs, on the English Channel, and is a fashionable resort. It is opposite to Boulogne, and steamers ply between that town and F. daily. It has a battery, a harbour admitting vessels of from 10 to 12 ft. draught at high water, and a market-house. It is also noted for its old parish church, and the free grammar school which was founded in 1674. The town also provides reading-rooms, public museums, a lending library, and a promenade pier and yavilion. The old pier was widened and lengthened in 1904. The Leas is a fashionable walk along the cliffs. There is a racecourse and F. 'chases are a feature of the meetings. There are two stations, F. and F. Harbour, and markets are held every Wednesday and Saturday. Pop. 37,571.

Folklore, the science of the elucidation of the peasant and local elements in modern culture. In the customs and traditions of the peasant class in all countries are embedded the knowledge of past events which history ignores, and religious and legal observances, the significance of which has long been forgotten. Those fragmentary survivals of a savage past are to be found in such apparently meaningless quantities as game rhymes, nursery rhymes and tales, ballads and märchen, village annual observances, and old saws. These survivals of an older culture remain among the non-progressive portion of the population, and their analysis and elucidation constitute the science of F.

The historical value of F. may be accepted in some measure as assisting in filling up the gaps in the story of a people as gleaned from documentary evidence alone. The logical and inductive treatment of traditions respecting persons and places often results in the elucidation of scientifically proved facts which throw considerable light upon the dark places of history. Thus the children's rhyme, 'London Bridge is broken down,' when taken into conjunction with sundry English, Breton, and Norse folk-tales, reveals, first, the intense interest and wonder of the Britons of the Roman period in the

architectural work of an alien and superior culture, and secondly, illustrates the fact that London Bridge was captured by King Olaf the Dane in the tenth century. Thus we discover the true attitude of the ancient Britons to their Roman conquerors, and can gauge the importance of a strife that was sufficiently stubborn to merit chronicling not only in the pages of the *Heimskringla* but in the more lasting song-treasury of youth.

The little that can be gleaned concerning some characters known to be historical may be supplemented by F., as in the case of Hereward the Wake, Rob Roy, and William Tell, tales regarding whom are prevalent in the districts where they dwelt. But in such cases the wonder element is mingled with fragments of fact, and considerable discrimination is necessary to arrive at sound conclusions.

The testimony of F. as regards ancient religious practice is chiefly afforded by old village or civic observances, customs in connection with calendric or seasonal changes or 'sacred' wells. For example, the town of Hawick, in the Scottish Border country, possesses an ancient civic rhyme sung annually at the riding of the town marches, which commences: 'Teribus and Teri Odin.' This in Anglo-Saxon is 'Tyr habbe us, ye Tyr, ye Odin,' or 'Uphold us, Tyr; uphold us, Odin,' so that the lay, sung with such fervour by the loyal lieges on all 'high' occasions, civic and political, is undoubtedly a fragment of an invocation to the northern war-god, Tyr, and the All-Father Odin. Such an example shows not only what the ancient religion of the townfolk of this Border burgh was, but also proves them to have sprung from a race of Teutonic origin, so that such a fragment of song is as full of proof as any 'historical' document.

Again, in many parts of Great Britain and Ireland 'sacred' wells are found, the bushes surrounding which are covered with rags. In pagan times these springs were regarded as the haunt of some minor deity or spirit to whom sacrifice of some description was periodically rendered. The rags surrounding these shrines are still offered up by the country folk, and the practice is strikingly illustrative of the 'substitution of the part for the whole,' which follows the break-down of the practice of human sacrifice; the rag representing a part of the person who makes the sacrifice. Fragments of worship of the rain-god are often retained in connection with well-worship, as in the Isle of Gigha, off the coast of Scotland, when the water of a sacred well is blown to the four

quarters of the heavens when rain is desired. A striking instance of the survival of a pagan rite is noticed by Camden in his *Britannia*, where he describes a curious ceremony which took place in St. Paul's Cathedral in his day. A stag, which the Essex family of Le Baud was required to pay for certain lands, used to be received by the priests standing at the steps of the church in their sacerdotal robes, and with garlands of flowers on their heads. As a boy he saw a stag's head fixed on a spear, and conveyed about within the church with great solemnity and sounding of horns. In the parish of King's Teignton in Devonshire, a lamb is drawn about the parish on Whit Monday in a cart covered with garlands, killed and roasted whole on Tuesday in the centre of the village, and sold in slices to the poor. At Holne, Dartmoor, a ram lamb is taken to an ancient granite pillar situated in a field called the 'Ploy Field,' its throat cut, and roasted whole. These rites have an analogy to Greek and Hindu festivals. Again, the 'Godiva' ceremony at Coventry was paralleled at Southam, near Coventry, where there were two Godivas in the cavalcade—one of them black—and at St. Briavals in Gloucestershire. This proved that the ceremony of the annual procession of a nude woman was not confined to Coventry, and when we find that Pliny alludes to certain ancient British rites to which women went naked and painted, we may be certain that the Godiva ceremony has more analogy to those than to the legend of the Saxon countess who underwent the ordeal of her nudity to obtain a privilege for her husband's peers.

The legal aspect of F. is almost equally important. Starting from the premises that most of the ancient legal codes of people in a barbarian condition are in verse of an alliterative form, we can see how many rhymes employed by the peasant class are fragments of ancient law. Thus the Scottish children's rhyme, 'Tappie, tappie touse, will ye be my man?' probably typifies the surrender of a freeman to an overlord. The rhyme gathers greater significance when we learn that the speaker seizes by the foretop the child to whom he addresses the words. Countless gifts of land are still commemorated in doggerel, and it is significant that until a late date in English law it was admitted as a principle that if oral declarations conflicted with written instruments the former had the more binding authority. The marriage service of the Church of England exhibits marked signs of

having been originally composed in verse.

Coming from the particular to the general, we find that many folk-tales describe a constitution of society which can only be classed as barbarous. We have in these vestiges of marriage by capture, the law of mother-right or descent from the female side, totemism, fetichism, and witchcraft or shamanism. In elucidating these—as indeed all F. problems—the ‘anthropological’ method, or argument by analogy from the habits and customs of existing savage races, is insisted upon by folklorists in contradistinction to the ‘mythological’ method, or elucidation by reference to natural phenomena. The adherents of these schools appear constitutionally unable to discern that only by a combination of the methods employed by each can the thorough and right elucidation of traditional matter be achieved. Where the folklorist sees only the record of some prehistoric custom or event, and the mythologist spies the history of a sun-god, the impartial observer may discover traces of both, or neither, and will hesitate to draw any hard and fast line betwixt sciences which must undoubtedly be combined at no distant date. But cases plentifully occur in which both methods may be singly employed. Thus by the anthropological we find in old tales the savage elements which prove their vast antiquity, to which has been superadded during the centuries a certain amount of the matter of modern culture. We find, for example, queens who wear their crowns, yet open the door to callers, talking animals, a childlike belief in magic—all the simplicity and credulity of the barbarian condition.

Turning from folk-tale to folk custom pure and simple, the exact description of which is dubious, and which may or may not refer to religion, law, or history, we have such phenomena as ‘sin-eating,’ in which a paid person undertakes to devour the sins of the dead before burial through the medium of bread and salt, ‘in order that the deceased may not walk.’ This practice, accompanied in some districts by incantations, appears a relic of ceremonial cannibalism, by which the relatives of the deceased secured themselves from being haunted by the dead man by devouring him. Such, too, are the Irish customs of placing a dead person’s hand in the milk-pail in order that the milk may increase in richness, the taking of mould from graveyards for medicinal purposes, and so forth. Lastly, differences in race may be traced to many folk-customs; thus

the daubing of the bridegroom’s feet with soot in N.E. Scotland, the painting of the Southam ‘Godiva,’ the slaughter of the ram lamb at Holne, are all probably remnants of non-Aryan culture. The race has become absorbed, but its customs remain in a more or less fragmentary condition.

See Gomme, *Folklore as an Historical Science*, *Ethnology in Folklore*, and *Folklore Relics of Early Village Life*; Rhys, *Celtic Folklore*; Henderson, *Folklore of Northern Counties*; MacCulloch, *Childhood of Fiction*. See also the journals *Folklore* and *Folklore Record*.

Folkmoot, Folknote, or Folcmote (folk-meeting; A.-S. *gemot*, mot assembly), the name for the popular national assembly which met for political and judicial purposes or for deliberation in Anglo-Saxon times. The Germans and Scandinavians had similar assemblies in olden times. At first the meetings were held in the open air on the moot-hill, and all the freemen in the shire attended, but later only the head of each family was admitted, and the meeting was held in the moot-hall. The people were summoned by means of ‘The Axe and the Arrow,’ ‘The Fiery Cross’ (described in Scott’s *Lady of the Lake*), ‘The Wardstaff of the Ongar Hundred,’ ‘The Dumb Borsholder,’ etc.; and the officers of the court were the *burlieman*, who acted in the capacity of judge; the *roadmen*, or councillors; and the *stallere*, who was the superintendent of the court.

Folk-music, traditional melodies, the spontaneous expression of national temperament in popular times, and essentially an art of the peasantry. Nearly every race has its own folk-songs and dances; in primitive races they are almost invariably associated with religious rites. European F. is, of course, the finest, and the nationality of the chief types can be readily identified. Celtic, German, and Slavonic races have the strongest predilection for self-expression in folk-songs, and many of their examples are of rare beauty. F. is very strongly rhythmic, and of the most simple and regular construction. Several of the great composers have collected and transcribed folk-tunes, e.g. Brahms’ *Hungarian Dances*, Liszt’s *Hungarian Rhapsodies*, Dvořák’s *Slavonic Dances*, etc.; whilst nearly all composers have used them, more or less, in their works, notably Haydn (Hungarian), Mendelssohn (German and Scottish), Grieg (Scandinavian), Tchaikovski, Glinka, and Borodin (Russian), etc. Even nigger tunes have been used, chiefly by Coleridge-Taylor, who embodied both Ameri-

can plantation songs and African negro chants in several of his compositions; and Dvořák, who used plantation-songs in his 'New World' Symphony and the Op. 96 String Quartet (known as the 'Nigger' Quartet). Much attention has recently been devoted to the collection and study of British F., notably by Mr. Cecil Sharp (*Folk-Songs of England*), Mrs. Kennedy-Fraser (*Songs of the Hebrides*), and Mr. Rutland Boughton (in various writings on musical aesthetics); and the settings of Irish folk-tunes by Mr. Percy Grainger, the celebrated pianist, are well known. See MUSIC, SONG, etc.

Follicle, in anatomy, a small tubular gland. A dental F. is a sac enveloping the developing tooth; a Graafian F., one of the small vesicles in the ovary, each containing an ovum; sebaceous Fs., the glands of the skin which secrete sebum; hair Fs., the sacs enclosing the roots of the hair.

Folquet de Marseilles (1150-1231), a troubadour of Italian race. In 1198, being weary of love and having taken holy orders, he became abbot of Le Toronet in Provence. Here he joined Simon de Montfort and disgraced himself by his fanatical rage against the Albigenses, persecuting and slaying, until his victims, according to the story, numbered 500,000 persons. For this extraordinary zeal he was canonised by the church. He *d.* in the abbey of Grandelve, and was given a place in paradise by Dante. His many poems have not yet been translated into English. See Diez's *Leben u. Werke des Trouv.*, ed. Bartsch, 1832.

Fomentation (from Lat. *foveo*, I warm), a method of applying warmth to some part of the body, but very often the term is used to signify the substances used. Fs. are used to remove pain, and a simple one is made by dipping flannel into very hot water, boiling if possible, and wringing it out in a towel. This should be applied immediately and covered with wool and waterproof sheeting to prevent the escape of the heat. As soon as this becomes cool it should be replaced by another flannel. Very often boracic powder is dissolved in the hot water, and turpentine, camomile, opium, or belladonna is sprinkled on the flannel, especially when the pain is very great. Fs. are very efficacious in cases of pleurisy and colic, or for any pains in the chest or stomach, and very often a serious illness is warded off by prompt application of them.

Fonblanque, Albany William (1793-1872), an English journalist, descended from an old Huguenot

family of Languedoc. In 1828 he became editor of the *Examiner*, which he controlled for seventeen years (1830-47) with the utmost success. The paper, under the management of Leigh Hunt, had already a high reputation, but under the direction of F. it reached its zenith. He published a collection of his articles under the title of *England under Seven Administrations*, 1837. See *Life and Labours of Albany Fonblanque*, edited by Edward Barrington Fonblanque (London), 1874.

Fond du Lac, a city of Wisconsin, U.S.A., situated at the head of Lake Winnebago, 60 m. N.W. of Milwaukee. It lies among the hills and is the capital of Fond du Lac county. The first settlers arrived on the site about 1834, and it was chartered as a city in 1852. It possesses artesian wells and has a considerable lumber trade. Pop. 18,797.

Fondi (ancient *Fundi*), a tn. of Caserta prov., Campania, Italy, 13 m. from Gaeta, on the Appian Way. Close by is a salt lagoon (*L. Fundanus*). There are remains of a Gothic cathedral (with eleventh century mosaics), a Dominican convent where Thomas Aquinas taught, and the castle of the Colonnas. The ancient *Ocubus Ager* near by was very fertile and noted for wines. Pop. about 10,000.

Fonsagrada ('Holy Well'), a com. and tn. of Lugo prov., Galicia, Spain, 76 m. E.N.E. of Santiago, with flour mills. Pop. about 17,000.

Fonseca, Gulf of (Amapala Gulf or Bay of Conchagua), a large gulf of the Pacific, bordered by Salvador, Honduras, and Nicaragua, in W. Central America, discovered 1522-3, and named after the Bishop of Burgos. The volcanoes Conchagua and Coscaguina are on either side of the entrance (about 21 m. apart).

Fonseca, Manoel Deodoro da (1827-92), first president of the United States of Brazil, *b.* at Alagoas. He entered the army and took part in the wars against Montevideo (1864) and Paraguay. From that time his promotion was rapid, and after holding a number of military appointments, he became in 1886 governor of the province of Rio Grande do Sul. His interest in politics led him to embrace the cause of the republicans, with the result that he was recalled. On May 14, 1887, he issued a manifesto defending the political rights of military officers, in which he was supported by Viscount de Pelotas, and as a result won over the entire army. When Correa d'Oliveira became 'conservative prime minister he gave F. a command; six months later the

ministry was overthrown, and soon after F. returned and was persuaded to head an insurrection, and the army and navy being with him the result was a bloodless victory and the proclaiming of a republic, of which he became president (Feb. 1891). He was, however, unable to hold the reins, and in the following Nov. he resigned and retired from public life.

Fonseca, Marchioness of (*née Eleonora Timentel*) (c. 1768-99), a gifted Italian lady, studied under Spallanzani, married (1784) to the Marquis of F. Introduced to the court of Ferdinand IV., she became for a short time maid-of-honour to his queen, Marie Carolina. In 1789 she espoused the cause of the French Revolution. Her salon at Naples was the headquarters of opposition to the court, and she founded and edited the *Monitore Napoletano* during the ascendancy of the popular party in Naples (1798-9). On the restoration of Ferdinand she was executed.

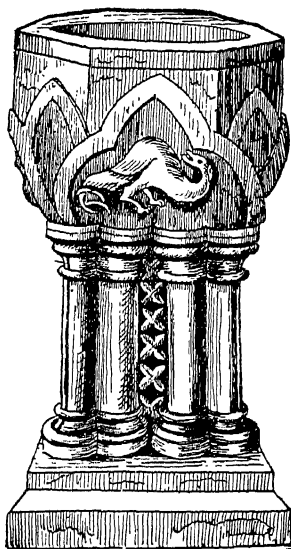
Font, the vessel or basin in which the water used for the rite of baptism is placed. In the earliest period the

rule this was much diminished in size, and was placed higher. When baptism came to be by affusion the size decreased still more, until we arrive at the F. as we know it, with a basin usually about 2½ ft. in diameter. The basin is supported on a pedestal which rests on one or more broad steps. The material is generally stone, and in the Rom. Church, where the chrism, required to be preserved for future use, is mingled with the water, the F. is often lined with lead. In the Middle Ages examples of Fs. composed entirely of lead also occur. The exterior is generally octagonal, sometimes circular, square, or hexagonal, and is frequently decorated in a rich manner. The F. almost always stands at the W. end of the church.

Fontaine, Jean de la, see LA-FONTAINE.

Fontainebleau (*Fontaine Belle Eau*, Lat. *Fons Bellaqueus*, or *Bleaudi*), a tn. of Seine-et-Marne dept., N. France, near the Seine, 37 m. S.S.E. of Paris. It is situated in a magnificent forest of 42,500 acres, one of the loveliest wooded tracts in France, and the haunt of landscape painters, notably of the Barbizon School (Rousseau, Corot, Diaz, Millet). There are quarries of sandstone and paving-stones, manufs. of porcelain, glass, and gloves. Grapes are freely cultivated, and there are also breweries. The school of practical artillery and engineering was moved here from Metz in 1871. The anct. royal palace (begun in the thirteenth century) has fine gardens and parks surrounding it. It was formerly one of the favourite royal residences of France. Pop. about 14,000. Consult Pfnor et Figeac, *Monographie de Fontainebleau*, 1866; *Guide artistique et historique au palais de Fontainebleau*, 1889; Bourges, *Recherches sur Fontainebleau*, 1896; Marie Louise Gothein, *A History of Garden Art* (translated by Laura Archer-Hind in 1928) (DENT).

Fontana, Domenico (1543-1607), an Italian architect, b. at Mili on Lake Como. In 1563 he went to Rome and Cardinal Montalto became his patron; under his auspices he built a chapel in the church of Santa Maria Maggiore, and the Villa Negroni. When his patron became Pope Sixtus V. he was appointed chief architect, and built the Lateran Palace, the Quirinal, and the Vatican Library. His most remarkable achievement, however, was the removal of the Egyptian obelisk (brought to Rome in the time of Caligula) from the circus of the Vatican to the front of St. Peter's (1586), of which he leaves a written account. When Clement VIII. became Pope,



FONT

baptistery contained a basin in the floor sufficiently large to allow the immersion of adult converts. When infant baptism became the general

F. was dismissed and went to Naples, where he became architect to the viceroy, the Count of Miranda, and did some good work. His son, Giulio Cesare, succeeded to his post and built the Naples University.

Fontana, Prospero (1512-97), an Italian painter, *b.* in Bologna. He belongs to that period of the Bolognese school that was influenced chiefly by imitators of Raphael. He executed an enormous amount of work, his subjects being chiefly sacred and profane history. Although his drawing was defective, he had a certain boldness and gift for combination which won him success, and he excelled as a portrait painter. At Bologna he started a school of art, and among his pupils were Lodovico

he published a translation from Pope, *L'Essai sur l'Homme*, *La Chartreuse*, and *Le Jour de Mort*, and in 1788 *Le Verger*, and *Epître sur l'Edit en Faveur des Non-Catholiques*. In 1790 he became part editor of the *Modérateur* and was proscribed, but went into hiding. On the fall of Robespierre he became Professor of Literature in the Ecole Centrale des Quatre Nations. He advocated a return to monarchy and was exiled, but went back later, and under Napoleon became president of the legislative chamber from 1804 to 1810. His *Eloge* on Washington was written at Napoleon's request. His works were collected in 1839 and edited by Sainte-Beuve with a life of the author.



THE PALACE, FONTAINEBLEAU

[D. McLeish

and Agostino. His masterpiece is the 'Adoration of the Magi,' in the church of S. Marie delle Grazie at Bologna.

Fontane, Theodor (1819-98), a Ger. poet and novelist, *b.* at Neuruppin in Brandenburg. The result of his tours in England was *Ein Sommer in London* and *Aus England Studien und Briefe*. He interested himself especially in old Eng. ballads. His *Gedichte* and ballads (*Männer und Helden*) tell of the glories of England in bygone days, but he was an ardent patriot, as is shown in his *Wanderungen durch die Mark Brandenburg*, 1862-82. F., however, is best known as a novelist. He wrote: *Vor dem Sturm*, a fine historical romance; *Effi Briest*; *Der Stechlin*, etc. F. *d.* at Berlin. See F. Sorvaes, *Theodor Fontane*, 1900; and *Briefe an seine Familie*, 1905.

Fontanes, Louis, Marquis de (1757-1821), a Fr. poet and politician, *b.* at Niort in Deux-Sèvres. In 1783

Fontarabia (Spain), see FUENTERABIA.

Fontenay-le-Comte, or Fontenay-Vendée, a tn. 19 m. N.W. by W. of Niort, on the R. Vendée, just where it begins to be navigable, in the dept. of Vendée, France. Hats, woollen goods, and coarse linen are manufactured, but the possession of the beautiful Romanesque church of Notre Dame (thirteenth century and onward) is the city's chief distinction. Pop. about 10,000.

Fontenay-sous-Bois, a tn. 6 m. E. of Paris, in the dept. of Seine, France. Commerce is chiefly in charcol, wood, and the produce of market gardeners. Pop. 11,500.

Fontenelle, Bernard le Bovier de (1657-1757), a Fr. advocate, philosopher, and poet, nephew of Cornelle, contributing to the *Mercurie Galant* by 1677 (edited by T. Cornelle). He has been called 'one of the last of the Précieux, or inventor of a new com-

bination of literature and gallantry,' and was in Voltaire's eyes the most universal genius of his age. He wrote tragedies (*Aspar*, 1681), operas (*Psyché*, 1678; *Bellerophon*, 1679), pastorals like Segrais (1624-1701), *Lettres galantes du Chevalier d'Her* (1685) in the style of Voiture (1598-1648). In 1688 he sided with the Moderns in the 'Quarrel of Ancients and Moderns.' In La Bruyère's *Caractères* he is satirised as 'Cydias.' He had a brilliant reputation in the salons of the time, and was at the height of his fame under Fleury's ministry (1726-43). His works include: *Poésies pastorales*, 1688; *Dialogue des Morts*, 1683; *Entretiens sur la Pluralité des Mondes*, 1686, maintaining the 'fascinating paradox' that planets and fixed stars are populous worlds; *Histoire des Oracles* (suggested by Van Dale's work), 1700; *Eloges des Académiciens*, 1699-1740. Admitted to the Fr. Academy, 1691, in spite of Racine's and Boileau's opposition, he was also admitted to the Academy of Sciences, 1697, and secretary from 1699 to 1741. His *Éléments de la Géométrie de l'Infini* appeared 1727; *Théorie des Tourbillons cartésiens*, 1752. See *Collected Works*, 1790 and 1825; Charma, *Biographie de Fontenelle*, 1846; Flourens, *Fontenelle, ou de la Philosophie moderne*, 1847; Fagnet, *Études littéraires sur le XVIII^e Siècle*, 1890; Laborde Milaa, *Fontenelle*, 1905.

Fontenoy, a vil. 5 m. S.E. of Tournay, in the prov. of Hainaut, Belgium. Here in 1745, during the War of the Austrian Succession, the Fr. under Marshal Saxe defeated the Duke of Cumberland and his allies, the onslaught of the Irish Brigade, which was fighting for the Fr., being irresistible. Pop. about 800.

Fontevrault ('Fons Ebraaldi' or the 'Well of St. Evrault'), a tn. 9 m. S.E. of Saumur, in the dept. of Maine-et-Loire, France. Here Robert d'Arbrissel founded a great abbey where a community of nuns and monks followed the order of F., which received papal sanction in 1106. Pop. about 2300.

Fonthill Abbey, see BECKFORD, WILLIAM.

Foochow, Fuchow, or Fu-chau, the cap. of the prov. of Fu-kien, China. It is on the R. Min, 34 m. from its mouth, and has been open to foreign merchants since the first Chinese War in 1842. Suburbs sprawl in every direction, but the city itself is girded by upwards of 5 m. of wall, 30 ft. high, topped at intervals by curious watch towers and pierced by seven gates. The river is spanned by the 'Bridge of Ten Thousand Ages,' which is supported by forty granite

piers and which was probably built in the eleventh century. The chief export is tea, the total exports in 1904 amounting in value to £1,034,436, showing a decrease on former years. After opium the staple imports are woven and metal goods, their value for the same year being estimated at £1,312,486. The trade of F. has declined in the past twenty years, notably in tea exports. This is largely due to the unfavourable position of the town on the landward side, where it communicates only with the province of Fu-kien, its outlet for tinned food, bamboo-pulp paper, and soap. There is a fair entry of trade through Hongkong and Shanghai. The great arsenal on Pagoda Island was instituted by Fr. engineers in 1867. Has one of the few dockyards in China. Since 1921 it has been the seat of the Christian University. Pop. 314,900 (1926 census of Chinese Maritime Customs); other estimates give 600,000.

Food and Feeding. Any substance capable of nourishing and sustaining the living being, when taken into the body, comes under this heading. Like the verb 'to feed,' food comes from a Teutonic root, whence Old English *foda* (cf. 'fodder'). Foods may be classed under three heads: gaseous, liquid, and solid; the first two consisting of the air or oxygen we breathe, and the water we drink. Solid foods are of three kinds, viz. nitrogenous, non-nitrogenous, and mineral. The first are essentially composed of carbon, hydrogen, oxygen, and nitrogen, and are flesh-formers. They furnish a limited supply of heat, and possess ingredients capable of building up and repairing the nitrogenous tissues of the body.

Non-nitrogenous compounds are composed of carbon, hydrogen, and oxygen, and are sometimes called carbonaceous compounds. They produce energy and force by keeping up the heat of the body.

Salts of potash, phosphates of lime and magnesia, iron, etc., form the mineral foods, these substances being found in nearly all parts of plants and animals used as food, the only mineral substance purposely added to food being common salt.

(1) Nitrogenous foods: albumen, fibrin, casein, gelatin, etc.

(2) Non-nitrogenous foods: starch, sugar, fats, etc.

(3) Mineral or inorganic foods: water, mineral matter, viz. salts of sodium, potassium, iron, and sulphur, etc.

Milk is a natural model food, as it furnishes all the nourishment required, and in the right proportion.

The influence of normal diet upon the health of man begins at the earliest stage of life, and for the young of all animals no food has been found more suitable than mother's milk. From the standpoint of nutrition, the most healthful food is that which is best fitted to the needs of the user, and in general, the best and most healthful food is really the cheapest. No foods have the carbon and nitrogen in proper proportion, and therefore it is essential to have recourse to a mixed diet. To a greater or lesser extent, however, the different nutrients are capable of doing one another's work, and if the body has not enough of one kind of fuel, it can use another. Protein, which is the organic basis of bone, muscle, and other tissues, and is essential to the body structure, may be burned in the body in the place of fats and carbohydrates, viz., compounds of starches, different kinds of sugar, and fibre of plants, chiefly found in vegetable foods, but these cannot take the place of the albuminoids in building and repairing the tissues of the body.

Experimental work on dietary has been done by numerous investigators, and by comparing the results of such investigations with the results of actual physiological experimenting, it is possible to learn about how much of each of the nutrients of common food represents the average requirements for food of persons of different habits of life and occupations. The amount of food required is modified by various factors. Children, for instance, require relatively more, because they are growing, and women need less, as a general rule, because they do less muscular work, and are smaller. Again, men engaged in muscular work need more food than those following sedentary occupations, and so on. Too much food is as bad as too little, and occasions a waste of energy and strength in the body, not to mention a waste of the nutritive material. Eating is more or less of a habit, and Sir Henry Thompson, an authority on dietetics, affirmed that more harm accrued to the race from over-eating than from over-drinking.

Cereal grains form an important article of food and are largely used all over the world. They contain an abundance of starch and consist of highly nutritive solid matter, but they are, as a rule, deficient in fat and salts.

Vegetable foods and tubers are of a highly nutritive quality, and form an important part of food. The potato, of course, is one of the most important tubers, and the chief

vegetables are those of the cabbage tribe, such as cauliflower, sprouts, kales, and broccolis.

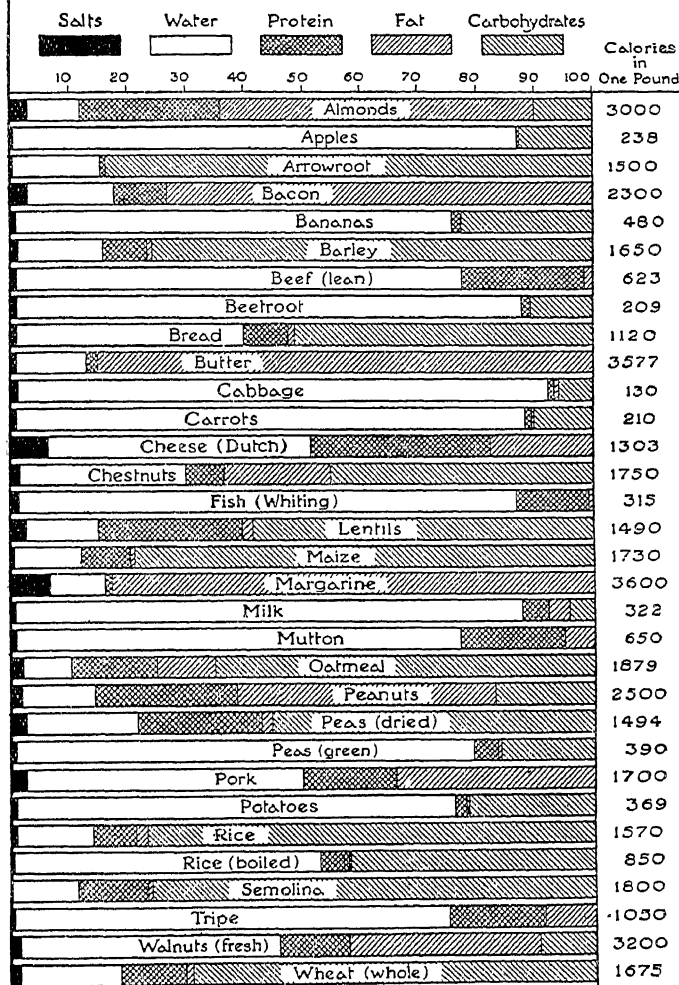
Fruit is principally of value on account of its sugar and vegetable acids. Nuts, too, though not so easily digested, are rich in nitrogenous matter.

As regards beverages, as previously stated, milk is the most important from the nutritive standpoint, as it contains all the necessary foodstuffs. The main constituent of every beverage is water. The chief restorative beverages are tea, coffee, and cocoa; they have a stimulative effect, but are of little nutritive value. Alcohol, on the contrary, is a food of some considerable nutritive value, which, however, is eliminated if taken to excess. It stimulates the action of the heart and slightly raises the temperature of the body. There are many diet-systems in vogue, both in health and in disease. Perhaps the one which has attracted most attention of late years is the anti-uric acid régime known as *Purin-free dietary*. This system is based on the theory that in such disorders as gout, renal disease, neuralgia, etc., the body retains in its system a preponderance of uric acid and other purin bodies, which results in a poisoning of the tissues. Purins are substances constructed on the base C_5N_4 , and most appetising foods, such as sweetbread, meat, and meat extracts, oatmeal, lentils, tea, coffee, etc., are rich in them, and should therefore be avoided by those suffering from chronic diseases of all kinds. Foods such as milk, cream, butter, cheese, eggs, macaroni, and fruits of various kinds, are, to some palates, less appetising; but are practically purin-free. The adoption of this dietary greatly reduces the risks of over-eating, and is easier to follow than other diets, restricted along more conventional lines. It should not, however, be followed indiscriminately, as, if too little protein food is taken, ill-health results.

Another system, which has a certain number of adherents, is the practice of living upon foods obtained exclusively from the vegetable world, and abstaining entirely from flesh food and all food obtained by the killing of animals. Vegetarians are usually also total abstainers from all alcoholic liquors. The average vegetarian admits into his diet such articles of food as eggs, milk, butter, cheese, cereals, and some moderate vegetarians even eat fish. The movement took its rise about the middle of the nineteenth century, and the idea was best received in England, where there are numerous

COMPOSITION OF FOODS

Organic { Nitrogenous PROTEIN Tissue-formers
 Non-nitrogenous Sources of Heat & Energy { CARBOHYDRATES
 Inorganic - SALTS & WATER { FATS



vegetarian societies and restaurants. There are several varieties of vegetarian diet, but they all have one point in common, viz. abstention from flesh foods. In all ages there have been idealists who have advocated a vegetable diet, chiefly on ethical grounds, as exemplified by Plato, Plutarch, Shelley, Rousseau, etc., but they never had any very extensive following. The arguments for and against are many. Vegetarians maintain that flesh-eating is responsible for the propagation of some of the most serious diseases, especially cancer and tuberculosis. They also contend that nature provides the means of supporting life in the best and most nutritive form by such products as nuts, seeds, roots, eggs, etc., and not in the comparatively degenerate form of flesh. Anti-vegetarians object that with a purely vegetable diet, in order to obtain sufficient nourishment, an enormous amount must be consumed and that the waste products are excessive in quantity. Scientific opinion, too, is unfavourable to vegetarianism, it being held that the structure of man's stomach and intestines proves that nature intended him for an omnivorous animal, his digestive organs being fitted to derive nourishment from every kind of food. The advances in the knowledge of the construction of vegetarian dietaries in recent years have been considerable, one of the greatest developments in extending the bill of fare being the manufacture of nut meats. There are also many vegetable extracts useful for making soups and gravies especially prepared from grains by maling processes. Various combinations of cooked grains exist, such as shredded wheat biscuits and others—all satisfactory foods. Generally speaking, however, vegetable foodstuffs are less appetising than others, and the vegetarian feeder, in consequence, is less likely to indulge in excess.

Diabetic diet, devised for patients suffering from diabetes, consists in removing from the food, as far as possible, everything which easily turns to the formation of sugar in the system, especially all excess of farinaceous food. Gluten bread, that is bread composed of wheat without starch, skim milk, cheese, eggs, meats, fresh fish, and green vegetables are prescribed, and sugars, starches, and all foods of an indigestible nature should be avoided. Saccharin has lately been of great service in this diet, as it supplies the flavour of sugar without its objectionable properties. As regards beverages, sweet wines, liqueurs, ale, stout, cider, and cocoa

should be avoided, but brandy, whisky, burgundy, claret, aerated waters, coffee, and tea may be taken with impunity. Milk, too, is, as a rule, allowable. Generally speaking, a diabetic diet involves the use of foods rich in proteins and fat, and the abstention from those containing sugar and starch.

Banting system, for reducing obesity by means of a strict diet. The effect of this particular system of diet in his own case forms the subject of an interesting 'Letter on Corpulence,' published in 1863 by Mr. Wm. Banting. He was sixty-six years of age, 5 ft. 5 in. in stature, and weighed 202 lb., and by strict attention to diet managed to reduce the total amount of fat and in little more than a year lost 46 lb. of bodily weight. For breakfast, he took from 4 to 5 ozs. of any meat, except pork, tea, and dry toast or biscuits. For dinner, he took from 5 to 6 ozs. of any fish except salmon, any meat except pork, any vegetable except potato, any kind of poultry or game; two or three glasses of unsweetened wine, and a small quantity of dry toast. His tea he always took without milk or sugar, and his supper was similar to dinner. He made his own case widely known by the circulation of his pamphlet, and his system was tried by numerous people and proved to be a great success. The large amount of meat, however, in this diet would be unsuitable in many cases, and such a radical change should not be adopted without medical advice, as a prolonged course might have the effect of setting up dyspepsia. Other more or less similar systems have since been recommended.

Salisbury diet.—This was advocated by an American physician, Dr. Salisbury, as a cure for a large number of chronic diseases. His system consisted of a diet of meat and hot water only: from 2 to 4 lb. of the former and from 3 to 5 pints of the latter every day, to be continued for a few weeks. Then the diet is slightly relaxed; a little green vegetable and unsweetened milk being allowed with the meat, and the water taken less hot. All gristle, bone, fat, etc., are removed from the meat, which is minced and made into patties, to which condiments, such as pepper, salt, horseradish, etc., may be added. The hot water has to be taken in doses before eating. In this system, however, as in the Banting, the amount of meat taken is excessive, and would, in many cases, be injurious, too great a strain being thrown on the liver and kidneys. The Salisbury diet, however, has great

value in a modified form, viz. when it is restricted to meat foods, with an abundance of water, and a little toasted bread and milk; reducing to a minimum, or entirely cutting off for the time being, all sugars, starches and carbohydrates. It then becomes valuable as a corrective to all forms of rheumatism and gout. Cases of obesity are also sometimes subjected to this treatment.

Chloride-free diet.—This is a recognised system in some of the leading hospitals of Paris, and consists of a diet prepared, cooked, and eaten without salt. Foods are selected containing the minimum of inorganic salts, and no salt is added either in the cooking or as a condiment. This diet is especially recommended in the treatment of chronic kidney disease, dropsy, heart diseases, persistent diarrhoea, etc. In many cases the beneficial results of the treatment are quite remarkable, and leave no doubt as to the therapeutic value of a salt-free régime. Milk, butter, fruits, jellies, tea and coffee, bread made without and cereals cooked without salt constitute a practically salt-free dietary.

Forcible feeding.—This occasionally has to be resorted to in the case of disease and grave illness, when food cannot be taken through the mouth, and when it is essential to try the artificial method. It can be performed in two ways; either by introducing a rubber tube through the nose into the stomach, or by passing a tube up the bowel, introducing by both methods easily digested fluid food. The former method is chiefly employed in asylum practice, and the dangers of forced feeding in this way have been brought to the notice of the public in connection with the treatment of a certain section of political prisoners. There is no question that in these cases there is a very considerable amount of danger and risk, induced by struggling and violence and from the subsequent shock.

Food-poisoning.—In times past, this particular form of poisoning was thought to be extremely common, but at the present day it occurs only very rarely. Epidemics sometimes occur, but instances are not common. Food-poisoning may be classified under three main types: Metals, animal parasites, and plant parasites. Arsenic, lead, copper, antimony, tin, and zinc are the principal metals which have been known to cause poisoning in food. There was a widespread epidemic of poisoning by arsenic in Manchester and neighbouring cities of England from beer-drinking in 1900, which, on examination, was found to be due to the

glucose used in the manufacture of beer. Lead-poisoning frequently follows the use of water which has been conveyed through new lead pipes, or it may result from the use of leaden colouring matters in biscuits, bread, and cakes. Zinc and copper poisoning are the result of eating canned vegetables. Dangerous and sometimes fatal cases of poisoning by meat ptomaines result from eating sausages, pork pie, game, shell-fish, etc. The symptoms are serious gastro-intestinal irritation, developing either immediately or four or five hours after food. The common occurrence of poisoning by eating canned lobster, crab, or other shell-fish is due chiefly to the rapidity with which they decompose and develop ptomaine after the can has been opened. A peculiar type of poisoning from milk, ice cream, cheeses, etc., is also known, and seems to be due to the presence of a toxic substance. The most general poisons from vegetable foods are due to eating poisonous mushrooms, and the grains affected by ergot and allied species. A well-known disease in E. Japan, termed 'beri-beri,' is thought to be due to poisonous rice.

As already shown, foods, though differing so largely in texture and appearance, are made up of a few chemical constituents, together with a larger or smaller amount of water. The group 'fat' includes the fat of meat, as suet and lard, and true vegetable fats and oils, like olive oil or the oil in corn. Starches and other chemicals of a similar nature are included in the group 'carbohydrates,' which occur chiefly in vegetable foods.

It will be seen that meats, fish, eggs, milk, fresh vegetables, and fruits contain most refuse and water; animal foods, cereals, and dry vegetables contain most protein; fats and oils occur principally in the animal foods; starches are found almost exclusively in vegetable products and milk. The fuel value of food varies within wide limits, being greatest in those materials containing most fat and least water. See also VITAMINES.

Preparation and cooking of food.—This has much to do with its nutritive value, and many articles which, when raw, are unfit for nourishment, become very nutritious when cooked. Well-cooked food is wholesome and appetising, while the same material badly cooked is unpalatable. Cooking serves three distinct purposes. It alters the physical condition and structure of the food; renders it appetising by improving the appearance and flavour, and kills by means

of heat any disease germs, parasites or such-like organisms the food may contain. This last is a very important matter and applies to both animal and vegetable foods. Scrupulous cleanliness should also always be observed in serving and keeping food. Every care should be taken to ensure this for the sake of health, if for no other reason. If kept or handled under unhealthy conditions, food, and drink too, become very dangerous purveyors of disease.

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Food, Adulteration of, see ADULTERATION.

Food Control, British, in War-time. This question was examined and discussed by the Royal Commission on Food Supply in Time of War, appointed April 1903, their report being presented Aug. 1905. Much useful information about the national food-supply was collected together in it. The strength of the British fleet and the impossibility of blockading the whole British coast at once seemed to the majority of the commissioners a sufficient guarantee against the probability of famine and starvation through lack of imported foodstuffs. An opinion was expressed that a system of national indemnity against loss from capture by the enemy would be an extra security to overseas trade. At the same time a few of the commissioners pointed out that there is rarely more than seven weeks' supply of grain in the country at one time, and this would soon be exhausted on the outbreak of war. The experience of the Great War falsified the more optimistic of these opinions. The general conditions of the Great War

restricted, and in some cases caused an entire cessation of, the normal distribution of the food supply of Europe, and the resultant shortage of food became a problem of first importance in the belligerent countries. During the first two years of the War, Gov. interest in food was concentrated on the rationing of troops rather than on the food supply of the nation. But matters became acute in Great Britain about the middle of 1916, and in Oct. of that year a Royal Commission on wheat was set up, which soon expanded into an organisation for controlling the wheat supply of Great Britain, France, and Italy. In 1916 a Food Controller was appointed (Lord Devonport), and later a Ministry of Food was created. In the spring of 1917 the Gov. took over the supervision of all flour mills, and the people were exhorted to ration themselves according to a certain scale. The Ger. submarine campaign was also making itself felt in connection with the supply of food, and there were signs of growing unrest among the people. At this time sugar was rationed, but the system was extended to other commodities, and brought into being numerous F. C. Commissioners to administer the system. The following are some specimen rationed articles per head per week—sugar 8 ozs., butter and margarine 5 or 6 ozs., lard 2 ozs., meat 1s. worth, bacon and ham and other meats varied amounts, jam 4 ozs., cheese 2 ozs., tea 2 ozs. This scheme of rationing ended the queues which had previously gathered at shops and solved the problem of food distribution in a manner that caused little hardship. Towards the middle of the year the submarine peril was practically overcome (*see VINDICTIVE: ZEEBRUICK*). Lord Rhondda succeeded Lord Devonport as Food Controller in June 1917. Lord Rhondda died in the following June, and was succeeded as Minister of Food by Mr. J. R. Clynes (*q.v.*).

When the U.S.A. entered the war the question of F. C. early engaged the attention of Congress, and in order to give the Gov. power to deal with the situation, the Embargo Acts and Food Control or Lever Acts were passed. These gave control over imports, exports, and power to assist the production of home produce. In Aug. 1917 the Food Administration was set up under the able direction of Mr. Herbert Hoover. A novel system of rationing was introduced. Namely, days, known as 'less' days, on which a certain commodity was voluntarily not served or eaten.

A feature of F. C. in all countries

noticed, the animal smacks its lips, and saliva drips from the mouth. In 1883 the disease caused much loss in Great Britain, but from then till 1910 the country was practically free, and a large export trade in pedigree farm stock was built up. F-and-M. D. is compulsorily notifiable, and on its occurrence traffic in live stock over a large area is dislocated, and foreign ports are closed to all British live stock exports, in some cases for six months. During recent years local outbreaks have been successfully met by rigid methods of isolation and the prevention of movements of cattle from the area affected. A very serious outbreak in Scotland in 1926 led to the important discovery that the disease could be carried by fresh carcasses as well as by live animals. A committee set up to enquire into the matter made several important recommendations which resulted in negotiations between Great Britain and meat-exporting countries and the formulating of regulations.

Football, a game in which two teams of players play with a ball. There are two main codes of F. in this country, Rugby and Association; the former allows the ball to be carried as well as kicked, whilst in the latter game handling is prohibited. The affairs of the Association game are in the hands of the Football Association, whilst the Rugby Union controls those of the handling code. Several public schools, such as Eton, Harrow, and Winchester, play varieties of F. peculiar to themselves. The game as played in the U.S.A. is now very different from the Rugby Union game on which it was modelled. From the earliest times games with a ball were probably in vogue, and we have record of some amongst both the Gks. and Roms. The Gks. had a game which consisted simply in throwing the ball from one person to another, another game (*ἀντοππας*) in which the ball was struck with the palm of the hand on to the ground as often as possible, and one called *θαίνυδα*, in which the players threw from one to another, with tricks and feints. None of these games had so much in common with F. proper as the Gk. *ἐπισκήριος* and the Latin *harpastum*, the latter of which was in all probability the precursor of Eng. F. Pollux describes the latter as a game in which the players, divided into two bands, strove to carry the ball over two lines. There is no historical evidence to show that the Roms. actually introduced *harpastum* into Great Britain, but the probability is that they did so. There is no doubt, whatever the precise origin of the game, that it was known at a

very early time in England. Its name occurs before that of any other athletic sport which is popular at the present day. It is notable that Shrove Tuesday seems to have been the day on which more than all others F. was played, and the custom of a 'rough-and-tumble' game on that day still survives in some parts of the country. At Derby, for instance, all the able-bodied men in the parishes of St. Peter's and All Saints took part in the contest. The game began in the market place, a large ball being tossed up in the middle of the bands. The goals in such games were at opposite ends of the town, and nothing stopped the players, who took the ball through water if necessary, and recked nothing of broken heads, torn clothing, and such details. Such ball-play was popular also among the ancient Scots, for we find the Shrovetide game at Scone, in the county of Perth, described by Sir F. M. Eden, in his *Statistical Account of Scotland*. A feature of these games was their length, as they lasted in most cases for the major portion of a day. Fitzstephen, writing in the twelfth century, says that 'the boys annually on Shrove Tuesday play at the well-known game of ball.' Many further proofs of the popularity of F. among the ancient residents of the country are forthcoming. In many of the games, every able-bodied man was compelled to take part in the contest; the day was made a general holiday, and any player who was fortunate enough to ground the ball in goal was a popular hero. In all these early contests the element of danger both to life, limb, and property was considerable, and several proclamations were issued at various times forbidding it. Edward II., as a result of a petition of the citizens of London, issued a proclamation on April 13, 1314, commanding and forbidding the game to be played in the city in future, 'as many evils may arise, which God forbid.' In 1349 Edward III. published a proclamation against F. and in favour of archery; similar writs to that then issued at London were sent to the sheriffs throughout England. In the time of Henry IV., A.D. 1410, we find F. prohibited in Norman Fr., described among the *jeux importunes*, and again in the statute 12 Richard II. c. 6. James III. of Scotland ordered in 1417 that 'F., and golfe, be utterly cryed down and not to be used,' and a royal proclamation was made in England in 1491 against the same two sports. F. was by no means stopped by these prohibitions, being played to a very great extent in the reign of Elizabeth. There were still no set

rules for the conduct of the game, and no referees or umpires; consequently the number of accidents was large, and some of them were fatal. Proclamations continued to be issued against the sport, as in 1572 and 1581. In the seventeenth century various names appear to have been given to it; in Cornwall it was called 'hurling,' and in the Eastern counties 'camping,' or 'camp ball.' An exception to the rule of hostility to F. among kings was furnished by Charles II., who made a match at F. between his own servants and those of the Duke of Albemarle in 1681. During these times there was practically no opportunity for the working classes to indulge their liking for F. save on Sundays, as there was no Saturday half-holiday then. This desecration of the Sabbath naturally provoked the wrath of the religious people of the time, as is forcibly expressed by Stubbes in *The Anatomy of Abuses in the Realme of England*. Towards the end of the eighteenth century F. waned in popularity, and between 1820 and 1840 it was hardly ever played. But it survived. The reason for its survival must be looked for in the public schools, which each had a game peculiar to itself in many respects. The principal features of these games will be dealt with later, but the natural wish of the old boys of public schools to continue playing was primarily responsible for the revival of the game and the development of Association F.

The first attempts to originate a code of rules to enable old boys to play together was made at Cambridge University in 1846. Between that date and 1863, the date of the formation of the Football Association, sundry unsuccessful attempts were made to reduce the numerous school rules to one satisfactory code. In 1855 the Sheffield club was formed, in 1857 the Hallam club, and in 1859 the Forest Football Club, afterwards the famous 'Wanderers.' In 1863 the Football Association was started, and has gradually assumed control of the Association game, over which it is now the supreme authority in England. Similar associations govern the game in Scotland, Ireland, and Wales. In the early years of the game there were naturally many changes in the laws. Until 1869 handling the ball was permitted under certain conditions, but in that year the practice was abolished. The offside rule was settled in practically its present form by the London Association in 1867, but for ten years there were many differences between the Sheffield and London Association laws. In April 1877, however, the former association came into line,

and Association F. in practically its present form was generally played, though the laws of the Scottish Association did not coincide until five years later. The principal changes in the laws of late years enact that no player can be offside in his own half of the field, and that the goalkeeper can use his hands only in his own penalty area instead of in his own half of the field as formerly.

The dimensions of the field of play are: maximum length, 130 yds., minimum length, 100 yds.; maximum breadth, 100 yds., minimum breadth, 50 yds. The lines drawn at each end are the goal lines and the lines at the sides the touch lines, which are drawn at right angles to the former. The circumference of the ball shall not be less than 27 in. nor more than 28 in.; the outer casing is of leather, which covers an india-rubber bladder. At the beginning of the game the ball must weigh between 13 and 15 ounces. The goals are 8 yds. wide and 8 ft. high, and the maximum width of the goal posts and depth of the crossbar is 5 in. The goal area is composed of lines drawn for six yards from each goal post and connected by a line parallel to the goal line. The penalty area is formed by lines commencing 18 yds. from each goal post at right angles to the goal lines drawn for 18 yds. outwards, and connected by a line parallel to the goal line. The length of the game is 45 mins. in each half, with a short interval between. The teams toss for choice of ends, and the team that loses the toss kicks off. There are five forwards, three half-backs, two backs, and a goalkeeper; the centre-forward kicks off from the centre of the ground, round which a circle of 10 yds. radius is drawn. No member of the opposing side can cross either the half way line or this circle until the ball has been kicked off, which is done every time a goal is scored, as well as at the beginning of each half. The goalkeeper is the only man who may handle the ball, and he must not carry it more than two steps, under penalty of a 'free-kick.' Any player who is 'offside' must not interfere with the play in any way whatever. A player is offside if he touches the ball, passed to him from behind, when there are less than three of the opposing side nearer to their own goal line than he was at the moment when the ball was kicked, or thrown from a throw-in, to him. A player cannot be offside when the ball is kicked off from goal, when a corner kick is taken, when the ball has been last played by an opponent, or when he is in his own half of the field of play. A penalty kick is given for an

intentional infringement of Law 9 (which forbids tripping, kicking, jumping, and intentional handling of the ball) by the defending side within its penalty area. When a penalty kick is taken all the players, with the exception of the one taking the kick and the goalkeeper, shall be outside the penalty area. A goal can be scored from a free kick for an infringement of Law 9, but not from any other free kick. When a ball goes into touch it is thrown in by one of the opposite side to that which played it out; the thrower must have some part of both feet on the touch line when he throws the ball in. When the ball is played behind the goal line by a player of the opposite side, it shall be kicked off by any one of the players behind whose goal line it went, within that half of the goal area nearest the point where the ball left the field of play; but if played behind by any one of the side whose goal line it is, a player of the opposite side shall kick it within one yard of the nearest corner flagstaff. In either case an opponent shall not be allowed within 6 yds. of the ball until it is kicked off. A goal cannot be scored direct from a corner kick. The referee is assisted by two linesmen, who watch particularly where the ball goes into touch, and advise the referee when so asked. The referee has power to send off any player guilty of violent and gentlemanly conduct, and his decision in all matters is final.

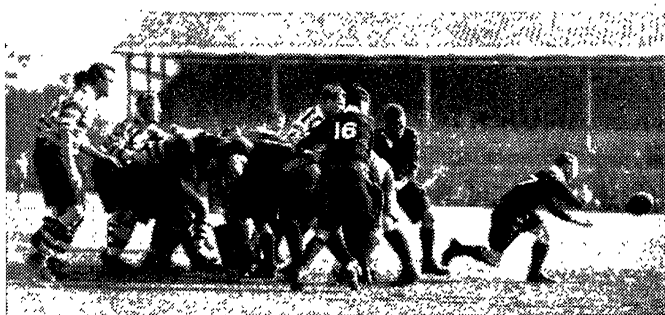
The most important competition of the year, because open to all clubs, is the English Cup. This was instituted in 1871, and in the first years only very few teams competed for it, but their number has gradually grown, until now the first qualifying round for the trophy is played off in the first month of the season. The Scottish Cup was started two years later, and Ireland and Wales now have similar cups. Owing to the greater skill of professional footballers, the English Cup is practically a competition for such teams, as no amateur club of recent years has survived longer than the first round of the competition proper. The present English Cup is a modern vase; the original was stolen from a shop window in Birmingham in 1895 while Aston Villa were the holders. The clubs which have been most successful in the Cup Competition are Aston Villa and Blackburn Rovers, each winners on six occasions, Wanderers on five occasions, Sheffield United on four, and Bolton Wanderers on three. The English League was formed in 1888, and is now divided into three divisions (the third division comprising a Northern and a Southern

section), each with twenty-two clubs. The two top clubs in the second division are automatically promoted, displacing the two lowest clubs of the first division. The bottom three clubs of the second division have to seek for re-election. Since the beginning of the competition to the end of the season 1929-30, Aston Villa have been top of the League six times, Sunderland five times, Sheffield Wednesday, Newcastle United and Liverpool, each four times, Huddersfield Town and Everton, each three times, and Preston North End, Blackburn Rovers and Manchester United, each twice. As the English League is mainly composed of Midland and Northern clubs, the Southern League was formed in 1894 for clubs in the South. After 1920 the Third Division of the Football League was divided into a Northern and a Southern Section. The Scottish League was instituted in 1890, and consists of two divisions; the Celtic and Rangers have been the most prominent clubs. The Irish League consists of one division only. The Irish Free State and the Welsh League also have one division each. Up to 1929-30, in inter-league matches, the English League has played the Scottish League 35 times, having won 20, lost 8, and drawn 7; in the English and Irish League fixtures England has won 28, lost none, and drawn 3; the Scottish and Irish Leagues have played 30 games, the Scottish having won 27 and lost 3. The international record proper stands as follows: England v. Ireland, won 33, lost 4, drawn 7; England v. Wales, won 32, lost 6, drawn 9; England v. Scotland, won 16, lost 24, drawn 14; Scotland v. Wales, won 34, lost 6, drawn 10; Scotland v. Ireland, won 36, lost, 3, drawn 3; Ireland v. Wales, won 15, lost 19, drawn 10. In 1929-30 England became international champion for the first time since 1913 by winning the three international matches, against Scotland, Ireland and Wales. Outside the U.K. Ger. and England have played 5 matches of which England has won 3, while 2 were drawn. In 1930 England played Austria at Vienna, the result being a draw, and Scotland beat France at Paris.

Rugby Union Football, or *Rugger* as it is generally termed, in contradistinction to 'Soccer', is governed by the Rugby Union, which was founded in 1871 by the Blackheath and Richmond clubs principally. The laws of Rugby F. were recodified and issued in their present form in 1926. The ball used is oval in shape and composed of the same materials

as an Association ball; its length is from 11 to 11½ in.; its circumference, measured lengthwise, 30 to 31 in.; measured over the width, 25½ to 26 in.; and its weight at the beginning of a game is between 13 and 14½ oz. The score is made by means of tries and goals. A try is scored when the ball is touched down by one of the attacking side behind the opponents' goal line. A goal is scored when the ball is kicked over the crossbar and between the uprights of the opponents' goal. The width of the goal is 13 ft. 6 in., and the height of the crossbar is 10 ft.; the uprights extend for over a foot above the crossbar, and the ball may pass between them at any height. The field of play is 75 yds.

given as a penalty against the opposing team for some breach of the rules. A team consists of one full back, four three-quarter backs, two half-backs, and eight forwards. The New Zealand team introduced an alternative formation, consisting of one full back, three three-quarters, two five-eighths, two halves, and seven forwards. Seventy minutes, thirty-five in each half, is the usual time played. The choice of kick-off or goal is decided by tossing, and the kick-off is made from the centre of the halfway line. Any player who is onside may run or kick directly after the kick-off. A player is offside if he gets in front of the ball during a scrumage (this applies especially to the halves) or if the ball



[Tropical Press

RUGBY FOOTBALL

The ball coming out of the scrum

by 110 yds., lines are drawn parallel with the goal lines at a distance of 25 yds. out, these being known as the 'twenty-fives.' A goal may be scored in four different ways: (1) When a try is scored the ball is brought out any distance desired from the place where it was 'touched down,' at right angles to the goal line, and a place kick is taken. If this results in a goal, two points are added to the three already gained for a try. (2) A dropped goal is a goal from a drop-kick, which is a kick where the player drops the ball on the ground and kicks it immediately on the half volley. (3) A goal from a 'mark,' when a player catches the ball from a kick by the opposing side he may, instead of running with it, strike his heel into the ground and claim a 'mark.' A free kick may then be taken, and if a goal results it counts three points. (4) A penalty goal is a goal scored from a place kick which has been

has been kicked or is being run with by one of his own side who is behind him; when an opponent has kicked or touched the ball, or when one of his own side, with the ball, or the kicker of the ball in any case, has run in front of him. The ball must not be passed forward, or 'knocked on.' When a player is fairly tackled by an opponent he must at once drop the ball, which is then kicked on (it must not be at once picked up) or a scrum is formed. A 'scrum' consists of the opposing forwards packing in two bodies, generally three, in the first mark, then two, then three again, and shoving at each other. The ball is put into the scrum by the 'scrum half' of the side which did not commit the breach of the rules causing the scrum, and must be 'heeled out' as quickly as possible by the forwards to the rear, where the half is waiting for it. Offences which are punished by

free kicks are handling the ball in the scrum, 'feet up' in the scrum; hacking, tripping, and impeding, and tackling an opponent who has not got the ball. The most common offences are passing forward, knocking on, and offside. If the ball is kicked into touch it belongs to the side which did not kick it in; if carried into touch, to the side carrying it. A 'line out' is formed when the ball has gone into touch; the half-back who throws the ball in must throw it at right angles to the touch line, or a scrum is held where it deviated from the straight line. When a player has crossed the touch in goal line, after a player has touched the ball down behind his own goal, and after an ineffectual attempt to place a goal from a try has been made, the ball is dead. If, however, a player carries the ball over his own goal line and then touches down, a scrum is held 5 yds. out from the goal line, opposite where he touched down. In the cases where the ball is dead a drop kick or punt is taken by the defending side from their '25'; all the men of the side must be behind the man who takes the kick, or they are offside. A referee is in charge of the game, assisted by two touch judges with flags, which they hold up where the ball goes into touch; they also assist the referee in judging goals.

The first match between Scotland and England was played in 1870-71, the first match between England and Ireland in 1874-75; the first match between Scotland and Ireland in 1876-77, and between England and Wales in 1879-80. The first Welsh-Irish match was in 1881-82, and the first Welsh-Scotch match in 1882-83. Various small changes have been made in the rules from time to time, but the present system has not been altered in any essential points since 1886-87, though a penalty goal was not introduced until 1889-90. The county championship competition was organised on the present system in 1890-91. The question of professionalism caused a breach between many northern clubs and the Rugby Union. The northern clubs were paying some of their players for 'broken' time, and the Rugby Union set its face sternly against the introduction of any such system. As a result the Northern Union was formed, an institution which controls the professional Rugby F. of England; the professional game differs somewhat from the Rugby Union game. Only thirteen players form a team, and the scoring is slightly different; the result of the alterations is a more spectacular type of F. The following are the records of representative games up

to 1929-30; England v. Wales, won 23, lost 16, drawn 3; England v. Scotland, won 21, lost 21, drawn 10; England v. Ireland, won 31, lost 15, drawn 3; England v. France, won 18, lost 1, drawn 1; Scotland v. Ireland, won 22, lost 14, drawn 3; Scotland v. France, won 10, lost 4, drawn 1; Scotland v. Wales, won 21, lost 18, drawn 2; Wales v. France, won 17, lost 1, drawn 0; Wales v. Ireland, won 24, lost 14, drawn 2; Ireland v. France, won 13, lost 4, drawn 0. The Inter-Varsity games were started in 1873-74; results to 1930, Oxford 21, Cambridge 21, drawn 10.

The Eton games.—There are two separate varieties of football played at Eton, the wall game and the field game. The former game is played by only a small proportion of the boys, but is interesting from its peculiarities. The ground is bounded on one side by a wall about 9 ft. high and 120 yds. long; on the other side by a line drawn parallel to the wall at a distance of 6 yds. from it. Another wall containing a door runs at right angles to the wall, and at the other end of the ground is a large elm; the door and a chalked space on the trunk of the tree form the two goals. Vertical white lines are marked on the wall at a distance of 10 yds. from each end, this space is good calx (later chalk from the chalk line) at the door end, and bad calx at the tree end. Eleven players are on each side, three 'walls,' two 'seconds,' three 'outsides,' and three 'behinds.' The ball is of the Eton species, much smaller than an Association ball, but of the same shape. A 'bully' is formed against the centre of the wall by the 'walls' and 'seconds'; when the ball comes out each side tries to kick it forward. Scoring is by shies and goals, one of which outweighs any number of shies. A shy can be claimed when the ball is in the opponents' calx, if a player touches the ball when in the bully but lifted off the ground and resting against the wall, held by the foot of one of his own side. A goal can then be scored if the toucher throws the ball and hits the goal.

The field game is more generally played at Eton. The ground is 150 by 100 yds., and goals 12 ft. in width and 6 ft. high. Eleven players form a side, divided up into eight forwards and three behinds. The game is begun by a 'bully' in the centre of the field. Four players form the bully, just outside the bully on each side is a corner, and an 'extra corner' on one side, whilst just behind is the 'flying man'; then comes the 'short behind,' the 'long behind,' and the 'goals.' There

are three penalties in the game, one for handling, one for cornering, that is to say taking a sideways pass, and sneaking or being in front of the ball. The eight forwards should act as a wedge in play, to drive the ball straight through the opponents' goal. Scoring is by goals and 'rouges'; a rouge is somewhat akin to a try in Rugby F., as the ball has to pass over the goal line and be touched down by the attacking side; a bully is then formed one yard from the centre of the goal. One goal is equal to three rouges, that is to say, converting a rouge trebles its value.

The Harrow game is played with a ball which resembles a church hassock in shape, flattened at the sides and irregularly circular elsewhere. The ground is about 150 by 100 yds. Two upright poles without any crossbar, 18 ft. apart, mark the goals. A goal is scored by kicking the ball between them at any height. Any number of players may form a team, but in matches the number is eleven. These are made up of two backs, one player on each wing, 'top side' and 'bottom side,' and five others who play in the centre. Any player who is in front of the ball is offside and out of play until the ball is played by an opponent or one of his own side who is not offside. Dribbling is the main feature of the game, but a player is allowed to catch the ball from a kick. He then shouts 'yards,' and is entitled to a free kick.

The Winchester game is played with a ball slightly smaller and lighter than an Association ball. The ground is 80 yds. by 25 yds. A net runs along each of the long sides to a height of 10 ft., and a line of stakes and ropes 1 yd. inside the net. This enclosed space is called under ropes. A furrow, called 'worms,' is marked on each short side. A goal is scored by kicking across 'worms,' but the ball must not touch ropes, stakes, or nets, or an opponent. The game is started by a 'hot,' or 'scrum'; hots are also held as penalties, and when the ball goes out of canvas. The opposite rule is the same as that of Harrow. Passing and dribbling are prohibited, as is drop kicking; the ball must be punted at a height of less than 5 ft. A man may be charged and collared when catching a ball. For some matches fifteen a side are played, but for the most important matches six a side are played, four 'ups' and two 'behinds.'

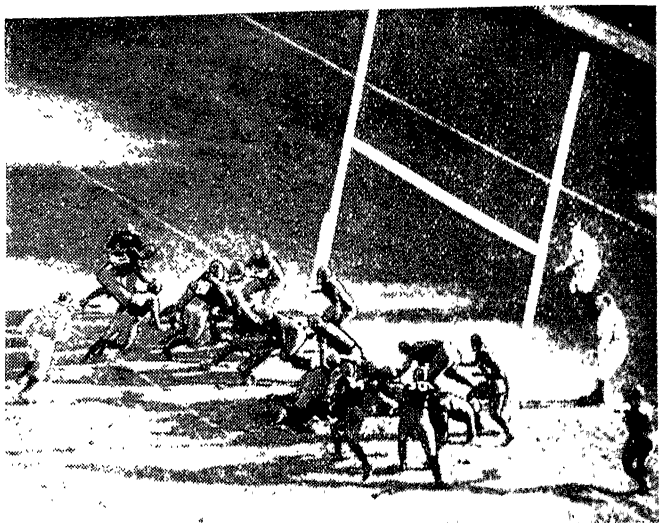
Football abroad.—Both Rugby and Association have of late years been taken up very keenly on the Continent; a list of international games will be found above. Germany, Austria, Holland, Sweden, and France

have taken up F. with great enthusiasm, and the game has increased in popularity in Spain, Italy, and Czechoslovakia. In 1927 France beat England for the first time. In the Dominions Canada and Australia have codes of their own, but New Zealand and S. Africa play under Rugby Union rules. In 1905-06 the New Zealand (All Blacks) team visited the U.K. and won all their matches excepting that against Wales, and again in 1924-25 a second All Blacks team toured Great Britain, winning all their matches. In 1906 the first South African team in Great Britain won 25 matches, losing only to Scotland and Cardiff and drawing with England. In 1912-13 a second S. African team, touring Great Britain, won all its matches. The first visit of the Australian ('Wallabies') team was in 1908-09, 25 matches being won out of 31, and during a second Australian tour in 1929-30 35 games were played of which Australia won 24. English teams have toured Australia and New Zealand in 1888, 1899, 1904, and 1908, and S. Africa in 1891, 1896, 1903, 1910, and 1921, while in 1927 an English team in the Argentine won all its matches.

American football.—From colonial times until 1871 a kind of Association F. was played by the colleges in the U.S.A. A 'Soccer' championship has been in existence since 1913, and those clubs which have won on more than one occasion are the Bethlehem Steel Co. F.C. and the Fall River F.C. In 1871 a code of rules founded on English Rugby was imported from Canada, and played under, at first, by Harvard University. The laws were not very satisfactory, however, and in 1876, after a match had been played with Yale under mixed rules, the Rugby Union laws were adopted generally. An annual convention was appointed to modify the rules as required, but the roughness of the game reached such a pitch that at one time the authorities forbade the matches between Harvard and Yale. The University Athletic Club of New York invited a Rules Committee to revise the laws of the game, which is now less rough and more scientific, and is being taken up by private and public schools, etc. The season lasts only from the middle of Sept. to Dec. 1; professionalism in F. has never prospered in the States. The teams are composed of eleven men. The ground is 330 ft. long by 160 ft. wide, and is divided by chalk lines into squares of 15 ft. side, leaving a 5 ft. strip clear on each side, parallel with the touch line. The middle line and two lines, 25 yds. from each

goal line, are made wider than the others. The goal is composed of two uprights more than 20 ft. high, 18 ft. 6 in. apart, and joined by a crossbar at a height of 10 ft. The ball is the same as an English Rugby ball. The game consists of two halves of 35 minutes each, with an interval of 15 minutes. The officials are: an umpire to watch for fouls, a referee to watch the progress of the ball and of play, a field-judge who assists the referee and keeps the time, and a linesman, assisted by a man

mands which inspire the 'tricky plays,' such as the 'fake-kick,' the 'wing-shift,' 'double passes,' 'false passes,' 'delayed runs,' etc. In order to prevent blocks it was enacted that 10 yds. must be made by one side in three successive attempts. The great feature of American F. is the 'interference' which is allowed; the game resolves itself into a series of scrums interspersed with runs and kicks. Each man faces his opponent in the scrum, and thus a species of man to man contests is continually



(Topped Press)

AMERICAN FOOTBALL

A Yale back being tackled after he had hurled through the crimson line for a gain against Harvard

from the partisans of each eleven, who marks the distance gained or lost in each play. There are seven forwards (two guards, two tacklers, two ends, and a 'centre-rush' or 'snapper back'), a quarter-back, two half-backs and a full back. A touchdown (a Rugby try) is 5 points, a goal 6 points (1 point more for conversion of a touchdown), a goal from the field 4 points, and a 'safety' (an English Rugby touchdown) 2 points. A man is offside as in English Rugby, but is put onside when the ball strikes the ground. The quarter-back is the general of the side; it is he who shouts the code words and com-

going on. Another feature of American F. is the 'shift,' a tactical manœuvre entailing a sudden change of formation; various 'shifts' have been developed but were regulated by rules after 1922. The principle of substitution of one player for another in the course of the game is admitted. Development has been towards transforming the English rugby code into an intricate and partly standardised system of tactical play. See *Football in the Badminton Library*, edited by M. Shearman; M. Shearman and J. E. Vincent, *Football, its History for Five Centuries*, 1885; N. L. Jackson, *Associa-*

tion Football, 1900; Rev. F. Marshall, *Football, the Rugby Union Game*; C. W. Alcock, *Association Game*, and different F. annuals. See also W. Camp, *American Football*, 1891; A. M. Weyand, *American Football*, 1926; W. W. Wakefield and H. P. Marshall, *Rugger*, 1927; W. J. A. Davies, *Rugby Football*, 1928; C. M. Buchan, *Association Football*, 1928.

Foote, Andrew Hull (1806-63), an American naval officer, joined the navy in 1822 and, after aiding in the suppression of pirates in the W. Indies, received his captaincy in 1849. In 1856 he distinguished himself by his gallant capture of the Chinese forts at Canton, whilst on the declaration of civil war he took full charge of the western flotilla, and in 1862 made with his gunboats a brilliant and successful assault on Fort Henry. Congress gave him a special vote of thanks when, a few months later, disablement obliged him to retire.

Foote, Samuel (1720-77), an actor and dramatist. After squandering his patrimony, went on the stage, making his first appearance in a small part in *Othello* at the Haymarket in 1744. He at once achieved some success, and later became a fashionable actor, and was highly regarded by the public of his day. Occasionally he gave entertainments, in which he was able to exhibit his powers of mimicry, which were very considerable. He wrote many plays, some of which were highly regarded, but they have long since been consigned to oblivion. More than once the censor interfered with his productions, and he was forbidden to play his *Trip to Calais*, in which he lampooned the bigamous Duchess of Kingston. A clever man and a brilliant conversationalist, he was much sought, but his selfishness and unscrupulousness left him almost friendless. There is a biography by William Cooke (1805).

Foot Guards, select regiments, the 'flower of the British infantry,' including Grenadier (three battalions), Coldstream (three battalions), and Scots Guards (two battalions), the Irish Guards (one battalion), and the Welch Guards (one battalion). They form the garrison of the metropolis. See HOUSEHOLD TROOPS and under the names of the several regiments.

Footpaths, and Preservation of, paths for the use of pedestrians (foot-passengers) only, as opposed to highways for vehicles or horses. The Commons and Footpaths Preservation Society (formed 1899 by amalgamation of the National Footpath Preservation Society with the Commons Preservation Society) aims

at preserving footpaths, bridle-paths, and other rights of way. It serves to guard public rights to common land, roadside waste, village greens, and all open spaces of the kind. See Hunter, *Open Spaces* (2nd ed.), 1902; Pratt, *Highways* (15th ed.), 1905; London offices are at 25 Victoria Street, Westminster. Scotland has a similar Scottish Rights of Way and Recreation Society, Ltd.

Footscray, a busy manufacturing suburb of Melbourne, which lies 4 m. to the E. in Victoria, Australia. It is in Bourke co. and on the Saltwater R., and is noted for its bluestone quarries. Pop. 20,000.

F.O.R. Abbreviation for 'free on rail,' denoting in contracts for the sale of goods that the cost of carriage and handling the goods and putting them on the railway, but not the cost of the railway freight, must be paid by the seller.

Forain, Jean Louis (b. 1852), a Fr. painter and designer, best known as a caricaturist. His humorous sketches of contemporary Fr. life and manners have appeared since 1893 in the *Journal*, *Figaro*, *Echo de Paris*, *Monde parisien*, *Revue illustrée*, *Journal amusant*. Some excellent examples were in the *Courier français* and *Vie parisienne*. He has been called a 'Juvenal of the pencil.' For collections of his work, see *Album Forain: la Comédie parisienne*, 1892; *Les Temps difficiles*, 1893; *Nous, vous, eux*, 1893; *Doux Pays*, 1897. With Caran d'Ache he founded the satiric *Psst!* (1898), in which a fierce protest was made against a second hearing of the Dreyfus case. It was answered by the *Sifflot* of Hermann Paul and Ibels. Made Hon. R.A., June 1930.

Foraminifera (bearing 'foramina' pores), in zoology, the name first given by D'Orbigny (1826) to a group of minute animals, a shell or 'test,' usually perforated by tiny holes being characteristic of most of the species. Since Dujardin's researches (1835) they have been considered as a sub-division of Protozoa, and are ranked as an order of Rhizopoda, distinguished by pseudopodia given off from the sarcode (protoplasm) and beautiful calcareous shells. The shells may be chitinous or arenaceous also (covered with sand, mud, etc.), and these are rarely perforated. There are usually one or more 'general apertures,' through which the animal within can come into contact with the water. They are mostly marine animals, but some kinds (with chitinous shells) are found in fresh water. The shells may be formed by a single chamber, or by several (polythalamous). Comparatively little is known

of the animals themselves, but as limestone-builders their deposits remain in S. Europe, N. Africa, and Asia. Among the chief families are the Gromidæ, Miliolidæ, Globigerinidæ, and Nummulinidæ. They appear to have been most abundant since the close of the Paleozoic era. See Chapman, *The Foraminifera*, 1902; Lister in Lankester's *Treatise on Zoology*, 1903.

Forbach, tn. on a tributary of the Rossel, 33 m. E. by N. of Metz, in the prov. of Alsace-Lorraine, Germany. Garden tools and papier-maché are manufactured, and there are coal mines and iron works. Here the Fr. suffered a defeat during the Franco-Prussian War (1870). Pop. about 10,000.

Forbes, a tn. on the r. b. of the Lachlan, 90 m. W. of Bathurst, in the co. of Ashburnham, New South Wales. It has a meat-freezing works and a wool-scouring factory. Pop. 4300.

Forbes, Alexander Penrose (1817-75), a Scottish divine, b. at Edinburgh. He was educated at the Edinburgh Academy and also attended the Glasgow University for one session, winning distinction as an Oriental scholar. He completed his studies at Haileybury College, and in 1836 obtained an appointment in the Indian Civil Service, leaving England for Madras. He was soon obliged to return to his native country, however, on account of his health, and entered Brasenose College, Oxford, where he obtained a Sanskrit scholarship in 1841. Here he became associated with Pusey, Newman, and Keble, and it was owing to their influence that he resigned his Indian appointment and was ordained deacon and priest in the English Church in 1844. After holding several curacies, he succeeded Bishop Moir in the see of Brechin, and removed his episcopal residence to Dundee, where he lived till his death. He wrote various commentaries, reviews, etc., amongst them being *A Short Explanation of the Nicene Creed*, *Commentary on the Canticles*, etc. See Mackey's *Bishop Forbes, a Memoir*.

Forbes, Archibald (1838-1900), a British war-correspondent and journalist, b. in Morayshire. He was educated at Aberdeen University, and then served in the Royal Dragoons. But he soon abandoned the army for journalism, and joined the staff of the *Daily News* as war-correspondent, accompanying the Ger. army through the war of 1870-71, and afterwards witnessing the rise and fall of the Commune. He then proceeded to Spain, where he chronicled the outbreak of the second

Carlist War. As representative of the *Daily News* he accompanied the Prince of Wales on his tour through India in 1875-76. He then went through the Serbian campaign of 1876, and in the following year was with the Russians in their campaign against the Turks. During the Afghanistan campaign of 1878-79, F. was under fire, and after that he visited Mandalay and Zululand, and his famous ride of 120 m. in fifteen hours to convey the news of the victory of Ulundi to England ranks as one of the finest achievements in journalistic enterprise. He afterwards devoted himself mainly to lecturing at home and in America and Australia. His chief publications are: *My Experience in the Franco-German War*; *Souvenirs of some Continents*; *The Afghan Wars*; *Barracks, Bivouacs, and Battles*; *Czar and Sultan*; *Memories and Studies of War and Peace* (in many respects autobiographical); *William I. of Germany: a Biography*, 1888.

Forbes, David (1826-76), an Eng. geologist and brother of Edward F., b. at Douglas, Isle of Man. He had acquired a remarkable knowledge of chemistry at the early age of fourteen, and studied the subject later at the university of Edinburgh. He travelled all over the world as a civil engineer, studying rock formations and fossils. In England he was a pioneer in microscopic petrology, and was elected F.R.S. in 1858. He wrote upwards of fifty papers on scientific subjects, among which are the following: *The Relations of the Silurian and Metamorphic Rocks of the South of Norway*; *Researches in British Mineralogy*; *The Causes producing Foliation in Rocks*, etc.

Forbes, Duncan (1685-1747), a Scottish statesman and jurist, b. near Inverness. He studied at the universities of Edinburgh and Leyden, and in 1709 was admitted advocate at the Scottish Bar, where he secured rapid advancement, owing both to his own talents and the influence of the Argyll family. In 1722 he was returned member for Inverness, and 1725 became Lord Advocate. He attained the highest legal honours in Scotland in 1737, when he was made Lord President of the Court of Session. His term of office was characterised by quick and impartial administration of the law, and he carried out some useful legal reforms. The rebellion of 1745 found him still at his post, and it was mainly owing to his exertions that it was prevented from spreading more widely among the clans. F. was the author of *Thoughts on Religion*, the *Culloden Papers*, and several other publications.

Forbes, Edward (1815-54), an Eng. naturalist, b. in the Isle of Man. From earliest childhood he occupied himself by collecting insects, minerals, fossils, plants, etc. In 1843 he became Professor of Botany at King's College, London, and curator of the Geological Society; and ten years later he was elected to the chair of natural history in the university of Edinburgh, doing much to advance and systematise special departments of this subject. A new era in that branch of zoology was begun by his classification of the British star-fishes. Upwards of 200 of his works and papers were published, notably: *Star-fishes, Travels in Lycia, Naked-eyed Medusæ, British Mollusca*, etc., etc. See G. Wilson and A. Geikie, *Memoir of Edward Forbes*, 1861.

Forbes, James David (1809-68), a Scottish scientist, grandson of Sir W. Forbes (d. 1806). He was Professor of Natural Philosophy at Edinburgh University (1833-60), and then became Principal of St. Andrews United College. With Brewster he helped to found the British Association (1831). His discoveries relative to the movement of glaciers and the polarisation of heat and light are famous. Among his publications are: *Travels through the Alps of Savoy* . . . , 1843; *Norway and its Glaciers*, 1853; *Tour of Mont Blanc and Monte Rosa*, 1855; *Occasional papers on the Theory of Glaciers*, 1859; *Dissertation on the Progress of Mathematical and Physical Science*; contributions to the *Edinburgh Philosophical Journal*, signed 'A.' See *Forbes's Life and Letters*, by Shairp, Tait, and Adams-Reilly, 1873; Tyndall, *Professor Forbes and his Biographers*, 1873.

Forbes, Stanhope Alexander (b. 1857), an Irish genre painter, pupil of Bonnat in Paris. He has exhibited since 1882 at the Royal Academy, becoming R.A. in 1910. His interior effects and contrasts of light and shade are especially good. Among his best pictures are 'The Fish Sale,' 'By Order of the Court,' 'Forging the Anchor,' 'The Smithy' (1895); 'The New Calf' (1896), and various portraits. He is a leading representative of the Newlyn School (Cornwall). His fresco of 'The Fire of London' in the Royal Exchange was finished in 1899. See *Art Journal*, 1893.

Forbes, Sir William (1739-1806), of Pitsligo, a Scottish banker and author, from 1761 a partner in the bank of Messrs. John Coutts & Co. at Edinburgh. Herries, Forbes, and Hunter-Blair were the real heads after 1763. F. was a member of Johnson's Literary Club. He wrote *Narrative of . . . Dame Christian Forbes*, 1875;

Life of Beattie, 1806; *Memoirs of a Banking House*, 1803. His bank became the Union Bank of Scotland (1838). See *Edinburgh Review*, x.; Chambers's *Lives of Eminent Scotsmen*.

Forbes-Robertson, Sir Johnston, a famous Eng. actor, b. Jan. 16, 1853, in London; son of the art critic (d. 1903). Educated at Charterhouse, at Rouen, and at Royal Academy. He early won distinction as a painter, exhibiting at the Royal Academy about 1870. He studied elocution under S. Phelps; making his first stage appearance in 1874, and soon becoming one of the foremost actors of his time, noted for his beautiful voice. He toured with



SIR J. FORBES-ROBERTSON

Ellen Terry; and acted also with her sister Marion, making a hit in *Dr. and Mrs. Neill*, and as Geoffrey Wynniard in *Dan'l Druce*, 1876. He has acted with the Bancrofts, Hare, and Henry Irving, and under his own management with Mrs. Patrick Campbell won success in *The Notorious Mrs. Ebb-smith* (1895), *Romeo and Juliet*, and other plays. He played with Mary Anderson in *The Winter's Tale*, 1887, designing the dresses for this production. Among his noted Shakespearian rôles are Hamlet, Othello, Shylock, Leontes, and Macbeth. As a romantic actor he has triumphed in *For the Crown*, 1896; *Mice and Men*, 1902; *The Light that Failed*, 1903; *The Passing of the Third Floor Back*, 1908. He married Gertrude Elliot (1900), and has since appeared with her as his leading lady—frequently touring in America, where *Cæsar and Cleopatra* was first produced (1906). His farewell London season was held at Drury Lane (1913), with selections from his repertoire.

Knighted, 1913. Retired from stage 1915. Wrote: *A Player under Three Reigns*, 1925. His brothers Ian Robertson (b. 1858) and Norman Forbes (b. 1859) are also actors.

Forbidden Fruit, or **Adam's Apple**, so called from the fruit forbidden to Adam (Gen. ii. 17), is the name often applied to several species of *Citrus*, especially on the Continent to *C. decumana*, a Malayan or Chinese tree much cultivated in India and Florida. *C. Medica* (var. *paradisi*) is also so called. In Great Britain pomelloes, a variety of shaddock, are known by this name. The fruit of *Tabernaemontana dichotoma* (Apocynaceae) in Ceylon also bears the name, and is fabled to be poisonous since Eve ate of it.

Forbin, Claude, Comte de (1656-1733), one of the greatest Fr. naval commanders. He showed reckless courage at Messina (1675), the Antilles (1680), Algeria (1682-83). He accompanied Chaumont to Siam (1685), becoming admiral to the King of Siam (1686-89). As *chef d'escadre* in the Spanish Succession War, he fought often against the Eng. and Dutch (1702-10). His *Mémoires* . . . were edited by Reboulet (1730). See Richer's *Vie*.

Force, in mechanics, that which changes or tends to change a body's state of rest, or of uniform motion in a straight line. This definition is derived from Newton's first law of motion, which states that every body continues in its state of rest, or of uniform motion in a straight line, except in so far as it may be compelled by impressed F. to change that state. We can only get an idea of F. by observing its effects, that is, F. can only be measured by measuring the change of motion produced by it. Thus, Newton's second law states that change of motion is proportional to the impressed F., and takes place in the direction in which the F. acts. By motion, Newton meant momentum, which is a function of the mass of a body as well as of its velocity. This agrees with our experience, because the idea of force is derived from muscular effort, and we know that we have to exert more strength to stop the motion of a heavy body than of a light one, just as we have to exert more strength to stop the motion of a rapidly moving body than of a slowly moving one. F., then, is measured by change of momentum, momentum being equal to mass \times velocity. But it is obvious that the longer the F. acts the greater is its effect in changing the momentum. Therefore, we have F. proportional to change of momentum and inversely proportional to the time. The unit of F. may

now be expressed as that F. which produces on a unit of mass a unit change of velocity, or, more concisely, force = mass \times acceleration. Given the foot as unit of length, pound as unit of mass, and second as unit of time, we have as the derived unit of F. that F. which, acting on a mass of 1 lb. for 1 sec., produces an additional velocity of 1 ft. per sec.; this unit is called the *poundal*. In the C.G.S. system of units, the unit of F. is the *dyne*, which is that F. which produces in a mass of 1 gramme an acceleration of 1 centimetre in 1 second per unit.

Forcellini, Egidio (1688-1768), an Italian lexicographer, was the pupil of Jacopo Facciolati, a professor at Padua. It was F. who assisted the latter in his great work, the compilation of a lexicon, and he, in his turn, brought out a new Latin dictionary, published after his death in 1771. The newest edition published is that of 1858 to 1887. See FACCIOLATI, JACOPO.

Forceps, a two-bladed metal instrument of the nature of pliers or pincers, used for seizing and holding objects firmly, especially in surgical and obstetric operations, and by dentists and watchmakers. There are many varieties, such as the dissecting F. with roughened points, the lithotomy F., the artery F., Liston's cutting F., and the fenestrated F. with apertures in the blade. The midwifery F., invented by P. Chamberlen in the seventeenth century, came into general use in the eighteenth century. Chemists and mineralogists use a small F. for adjusting weights and working with the blow-pipe. In entomology, the word is applied to an organ or part of the body resembling a F., or to one of its two branches. Examples are the horny appendages at the extremity of the abdomen, found in many mule insects, such as the earwig's caudal appendage.

Forces, Parallelogram of. Forces may be represented graphically by straight lines proportional to the velocities induced by them on a particle. In such a representation, the factor of mass is ignored. If two forces are represented in magnitude and direction by two sides of a parallelogram drawn from a point, then their resultant is represented in magnitude and direction by that diagonal of the parallelogram which passes through the point.

Forchheim, a tn. of Bavaria, Upper Franconia, Germany, on the Regnitz, 16 m. S.E. of Bamberg; important in the early Middle Ages. From 1062 to 1802 it belonged to the bishopric of Bamberg. Pop. about 9000.

Forcible Entry, *see* ENTRY.

Forcible Feeding, *see* FOOD AND FEEDING.

Forcing, the acceleration of maturity in flower, vegetable, or fruit, according as blooms, fruit, or foliage are desired. Artificial warmth is essential for F., and while in some cases a hotbed provides sufficient temperature, in other cases elaborately equipped F. houses are needed. Among flowering plants, hardy shrubs are most easily forced into early bloom, but they must be thoroughly matured and well provided with flower buds, or foliage instead of blooms will be produced. A large variety of bulbs and bulbous-rooted plants are well suited for F., and lilies of the valley are brought into bloom throughout the whole year. Most kinds of fruit can be produced by F. Strawberries are grown in pots standing on ash beds, and in a temperature of 75° fruit can be ripened by Christmas. Forced tomatoes need a similar temperature, but they meet with a very severe competition from importations from warmer countries and scarcely pay to grow. Grapes can be ripened at almost any time from the early spring by starting the shoots in a temperature of about 40° and gradually increasing it until after the flowering period, when from 60° to 70° is needed. Peaches, nectarines, and figs are forced in pots, starting with a temperature of 45° and increasing to 60°. Hardier fruits are forced in cold or orchard houses. Asparagus, potatoes, lettuce, endive, and other salad plants, seakale, chicory, and rhubarb are all easily forced on hotbeds; the three last need to be kept in the dark, but the others need abundance of light. Remarkable experiments have recently shown that the natural resting period of plants can be intensified by exposing them with their roots in an airtight box to chloroform or ether. This is followed by much increased activity, and lilac and azalea blooms have been produced in about a fortnight; lilies of the valley were forced into flower in only ten days. F. some of the hardier flowering plants is simplified by retarding the growth for a time in a refrigerating chamber. Following such treatment, lilacs, lilies, spiræas, and *Azalea mollis* will come quickly into flower in an ordinary cool greenhouse.

Ford, Edward Onslow (1852-1901), an English sculptor, studied painting in Antwerp and Munich (1870-72), and then took up sculpture. His most famous works are statues of Sir Rowland Hill (1882, Royal Exchange); W. E. Gladstone (1883); Irving as 'Hamlet' (1883); General

Gordon (Chatham, 1890); Shelley memorial at University College, Oxford; Marlowe memorial at Canterbury; Huxley (1900, Brit. Mus. of Nat. Hist.); busts of Millais, Briton Rivière, and others; statuettes of 'Folly,' 'Music,' 'Dancing' (Tate Gallery); a relief, 'In Memoriam' (1885). *See* Spielmann, *British Sculpture and Sculptors of To-day*, 1901.

Ford, Henry, American industrialist and greatest manufacturer of motor-cars in the world, was b. July 30, 1863, at Greenfield, near Dearborn, Mich.; son of Wm. Ford, farmer. His mother was Dutch. Educated



[Topical Press

HENRY FORD

at the district school. In 1880 he obtained a situation at \$2.50 a week in a machine-shop in Detroit, and night-work at mending watches—a thing he had taught himself at home. His shop-time was more than ten hours a day. He read machine-journals. In about a year he turned to engines, at which he did work in the shop for about two years; after that he was employed for two years more in installing and repairing farm machinery. On his father's farm he experimented in the manufacture of a steam tractor. In 1884 his father presented him with 40 acs. of timbered land, on which he erected and worked a saw-mill to dispose of the wood. In 1887 he became machinist in the employ of the

Edison company in Detroit, which has ever since been the centre of his activities. In 1888 he married. In 1892 he produced his first motor-car—a two-cylinder 4 h.p. In 1899 he left the Edison company and went into the motor-car business—founding the Detroit Automobile Company. He disagreed with his fellow-directors, who wished to restrict output to orders; and he resigned directorship in 1902. By himself he built some four-cylindered cars; and one, called 999, won all the races for which it was entered. Then he formed the Ford Motor Company with a nominal capital of \$100,000: by 1926 its assets were valued at a thousand million dollars—it being then the largest motor-car company in the world. The stock is entirely held by F. and his son, who have bought out the other stockholders. He introduced vanadium-steel into motor construction; and in 1909 the company standardised the 'T' model, which was the 'Ford car' known all over the world and was superseded only in 1927 by the 'A' model. A profit-sharing arrangement was begun in 1914, and the Ford employees were treated to short hours and high pay—the chief objections to the Ford method being the extreme to which specialisation in work is carried and the extent to which the worker is 'paced' by the machinery. In 1915-16 F. visited Europe as leader of a peace party, whose members went to various neutral capitals in an endeavour to end the war. He has founded factories in many European countries. His plant at Dagenham in England is the largest outside the U.S. In collaboration he is the author of several books giving the story of his career, and his views on industrial questions.

Ford, John (c. 1586-1639), an English dramatist, b. at Islington, Devon; studied at Exeter College, Oxford; and in 1602 became a member of the Middle Temple. In 1606 he published his first work, *Fame's Memorial*, an elegy on the death of the Duke of Devonshire, with a dedicatory sonnet to Penelope, Countess of Devonshire. In the same year he issued *Honour Triumphant*, or the *Peers' Challenge* . . .; also the *Monarchs' Meeting*, etc. In 1613 his first comedy, *An Ill Beginning has a Good End*, hitherto unpublished, was produced at the Cockpit. In 1621 was produced *The Witch of Edmonton* (published 1658), written together with Dekker and Rowley. Other plays written in collaboration were *The Sun's Darling*, 1623-24 (published 1656); *The Fairy Knight* and *The*

Bristowe Merchant, 1624, all with Dekker; and *A late Murder of the Son upon the Mother*, 1624, with Webster. In 1629 a comedy, *The Lover's Melancholy* (produced 1628), was the first of his plays to be printed. In 1633 his two best tragedies, *'Tis pity She's a Whore* and *The Broken Heart*, appeared. These are little inferior in impressiveness to the best works of Webster. His other plays were *Love's Sacrifice*, 1633; *The Chronicle History of Perkin Warbeck*, 1634; *The Fancies Chaste and Noble*, 1638; *The Lady's Trial*, 1638, and several lost dramas.

Ford (formerly Hueffer), Madox (b. 1873), Eng. author, son of Dr. Hueffer. His works include: *Ford Madox Brown* (biography), 1896; *The Brown Owl*; *The Face of the Night*, 1904; *The Soul of London*, 1905; *The Heart of the Country* and *The Fifth Queen*, 1906; *Privy Seal*, 1907; *Mr. Apollo*, 1908; *The Half-Moon*, 1909; *Songs from London*, 1910; *The Critical Attitude*, 1911; *Henry James: a critical study*, 1914; *Thus to Revisit*, 1921; *Joseph Conrad*, 1924; *New York is not America*, 1927; *The English Novel*, 1930.

Ford, Paul Leicester (1865-1902), American author, b. at Brooklyn, N.Y. Died at N.Y. Among his principal works are: *Writings of Thos. Jefferson* (1892), *Writings of Thos. Dickinson* (1886), *The True George Washington* (1896), and the following novels: *The Honourable Peter Stirling* (1894), *The Story of an Untold Love* (1897), *Janie Meredith* (1899), *Wanted: A Matchmaker* (1900), *Wanted: A Chaperon* (1902). Editor of *Bibliography*.

Fordingbridge, a tn., Hampshire, England, on R. Avon, here crossed by a stone bridge, 10 m. S. of Salisbury. There are flax-spinning and canvas industries. Pop. 3396.

Fordun, John of (d. c. 1385), a Scottish chronicler. Little is known of his life. He is supposed to have been b. at F. in Kincardineshire, and to have been a secular priest and a chantry priest in the cathedral of Aberdeen. Between 1303 and 1384 he is said to have travelled on foot through Britain and Ireland in search of materials for his chronicle of Scotland. Of his *Scottichronicon*, or *Chronica Gentis Scotorum*, only five books are completed, and the work was continued in 1441 by Walter Bower, who finally brought the history down to 1437. The work is the chief authority for Scottish history before the fifteenth century. The best edition of F.'s work is by Skene (2 vols. Edinburgh), 1871-72.

Forecasts, see METEOROLOGY.

Foreclosure, see MORTGAGE.

Foreign Debts, *see* PUBLIC DEBT.

Foreign Enlistment Act, an Act passed in 1870, which forbade the enlistment of any British subject in the army or navy of any foreign state at war with any friendly state. The Act states definitely that no British subject shall under any condition enter into the service of any state at war with a state which is friendly to the British, save with the consent of the king, or by an Order in Council. Any person who shall be guilty of attempting to obtain the services of any British subject shall be held to be a principal offender, and both accessories and the British subject who so enlist shall be punishable by imprisonment not exceeding two years. The officers of the customs or of any port have full power to detain any vessel concerning which they hold information that she is proceeding to the aid of some foreign state which is at war. This legislation was undoubtedly an immediate outcome of the celebrated *Alabama* case. Any ship so taken, together with all stores, arms, and equipment, becomes the property of His Majesty, and is by him confiscated. The mere purchase of goods in this country, such as guns and ammunition, which are not actually exported directly from this country to the state at war, has been held to be an infringement of this Act, as in the celebrated case of Colonel Sandoval (1886). It was under the provisions of this Act that the leaders of the Jameson Raid were punished (1895).

Foreigner, *see* ALIEN.

Foreign Exchange, *see* EXCHANGES, FOREIGN.

Foreign Jurisdiction Act, 1890. This Act takes the place of all the previous Acts relating to the exercise by the crown of jurisdiction outside the British dominions. The Act after a recital to the effect that the crown has jurisdiction in certain foreign countries by treaty, capitulation (*q.v.*), usage, and other lawful means, goes on to provide that it shall be lawful for the crown to exercise that or any other analogous jurisdiction in the same manner as if it had been acquired by the cession or conquest of territory. Any dispute as to the existence of such jurisdiction in any particular case is to be determined by a secretary of state in questions submitted to him by the court. The degree to which the crown's jurisdiction under the Act prevails varies in different cases; but in those countries that either have no settled polity or only a barbarous form of government, it is for the most part exclusive. The power given by the Act has been exer-

cised in two classes of cases: (a) British protectorates where the territory has not been formally annexed to the crown. In such cases the jurisdiction is exclusive. (b) In the dominions of Asiatic or African powers where the sovereignty of the native potentate is restricted only by capitulations (*q.v.*) and treaties. In this class of cases the crown jurisdiction, which is confined for the most part to British subjects and persons under British protection and to British ships, is exercised through consular officers and regulated by Orders in Council. Orders in Council conferring such jurisdiction have been issued to English consular officers in China and Corea, the Ottoman dominions, Siam, Persia, Morocco, Muscat (or Oman), and Zanzibar. In most of the above countries the crown's foreign jurisdiction extends also to admiralty, bankruptcy, lunacy, and probate cases, and there is generally full criminal jurisdiction. The Act also empowers the crown to direct by Order in Council that various scheduled Acts shall, with the necessary modifications, apply to a foreign country as if it were a British possession. These Acts relate mainly to the reception of evidence, and the ascertainment in particular cases of British and foreign law. *See* COMITY.

Foreign Law. The English courts do not take judicial notice of F. L., and the party who relies on a F. L. must prove it like any other fact. Strictly, all F. L. has, as such, no extra-territorial force; such effect as it has is by virtue of comity (*q.v.*), and unless specially proved in any particular case, the law of another state will be presumed to be similar to English law. *Written* F. Ls. must be proved by the text or some authoritative collection or duly certified copy of the same; expert evidence in such cases being merely by way of secondary evidence. The strict legal mode of proof of unwritten laws is not settled. In the United States English unwritten law is proved by text-books of established repute and the law reports as well as by expert evidence. In England foreign unwritten law is generally proved by oral evidence.

Foreign Legion, a name which is very often given to an irregular corps of volunteers, composed of foreign sympathisers of one of the states or countries which are at war; for instance, when small nations are engaged in a struggle for independence against more powerful opponents, a F. L. is often raised. The F. L. *par excellence* was the French *légion étrangère*, the right name of which is now the *régiment*

étranger, although the former term is still used colloquially. This legion was organised in 1831, with the idea of utilising the services of those foreigners who were sympathisers of France in the conquest of Algeria. It was formed at first in battalions like infantry of the line, but with varying numbers according to its effective strength. In 1867 it was restored to the strength of a regiment, and called in future *régiment étranger*. In 1884 the regiment was divided into four battalions, to which a fifth was added in 1891. No Frenchman can serve in this legion except by special authority and with the forfeiture of his rights of nationality. The recruits must be between eighteen and forty years of age, and sign on for a period of five years, with the option of re-engaging for two, three, four, or five years more. The officer commanding the legion can take in recruits without production of their birth certificates, etc., if he thinks it necessary. Foreign officers who join the legion may take an equal or inferior rank to that which they had held in other armies; the officers receive promotion only in the legion, never being transferred. The French F. L. has had in its ranks adventurers of all nationalities, and has seen much service in the colonies. The British legion, under Sir de Lacy Evans, raised in Great Britain, which took part in the Carlist wars, was different from most F. Ls. in that it was regularly enlisted and paid.

Foreign Marriages, see MARRIAGE AND MARRIAGE LAW.

Foreign Office (England), that great department of the executive through which negotiations with foreign powers are conducted. At the head of it is the Foreign Secretary, appointed from the dominant party in parliament. During the Conservative administrations of the twenty years preceding the return of the Liberals in 1906 the appointment generally went to a peer, and not infrequently the premier appointed himself; but since that date the position has frequently been held by a commoner. The Foreign Secretary is assisted by two Parliamentary Under-Secretaries, a Parliamentary Private Secretary, who also go out with the gov., a permanent Under-Secretary and three Assistant Under-Secretaries. It is needless to say that the post of Foreign Secretary is of such vital and commanding importance that it is essential to appoint to it a minister who, by reputation and attainments, is as far as possible above the rancour of merely party politics. It does not always happen that this counsel of per-

fection is attained; but more often than not some one is singled out by a kind of tacit unanimity; and further, it may be said that in the discussion of foreign policy the House does to an appreciable degree sink party differences and allow the Foreign Secretary considerable latitude as to the answering of questions in the House. Any premature publication of critical negotiations with other powers might obviously lead to disaster. In the discharge of the principal function, which is nothing less than the formulation of the British foreign policy, the Foreign Secretary is responsible both to the cabinet (*q.v.*) and to parliament; and for its due fulfilment he is necessarily in constant touch with the ambassadors, envoys, plenipotentiaries, or other foreign representatives in England, and with British diplomatic agents abroad, the latter of whom it is his duty to advise; and through our ambassadors and foreign representatives in England he should endeavour, so far as is consistent with British state interests, to promote cordial relations with foreign powers. The many criticisms of secret diplomacy in the House of Commons and in the Press during the Great War and the declared views of several statesmen who subsequently took part in the Peace Conference led to some public expectation that the powers vested in the F. O. would be more carefully checked by Parliament, and that more public statements would be made by the Foreign Secretary on current negotiations than had hitherto been the case. But the criticism was unreal and largely propagandist in purpose, while the expectation was based on an entire misconception of the true functions of a gov. department which is concerned with foreign relations; and in these circumstances it is not surprising that these ideas on the British F. O. vanished with the hostilities. Among the purely formal duties of a Foreign Secretary are the reception of new ambassadors and their presentation to the king. He has an extensive patronage, appointing not only our ambassadors to foreign courts, but numerous diplomatic agents and consular officers. Among his other duties are the superintendence of the preparation of trade statistics supplied by British agents abroad (*see* COLONIAL AGENTS), and the publication and distribution of the same to the different chambers of commerce; the granting of passports, and the protection of British subjects abroad who have suffered injury or wrong whilst abroad. In conjunction with the rest of the cabinet the Foreign Secretary carries into execu-

tion the treaty-making prerogative of the crown (*q.v.*).

Foreign Relations Committee. The U.S.A. have a Secretary of State in the President's cabinet who deals with foreign affairs. The President, however, is himself the responsible official for dealing with international subjects, but his decisions need the endorsement of two-thirds of the Senate. This arrangement, as laid down in Section 2 of Article Eleven of the Constitution, was planned with the object of maintaining a democratic hold upon the foreign policy of the gov. The difficulty of such a large body being required to deal with issues, many of which are too delicate and intricate in nature to permit of open discussion, and the fact that the President has no absolute guarantee that his actions will be endorsed, has led to the establishment, within the senate, of a Foreign Relations Committee, the restricted and qualified powers of which are fully realised by other nations. This committee works in close touch with the senate and the President. 'Even when the Foreign Affairs Committee approves an action by the President, it is not always certain that the Senate will approve.'

Foreland, North and South, two capes of England, projecting from the E. coast of Kent. They are composed of chalk cliffs. North Foreland is situated in lat. $51^{\circ} 22' 28''$ N., and long. $1^{\circ} 26' 48''$ E., and is 66 m. E. of London. A lighthouse is placed with a fixed light, 188 ft. high, visible 20 m. off. South Foreland is 16 m. S. of North Foreland, situated in lat. $51^{\circ} 8' 23''$ N., and long. $1^{\circ} 22' 22''$ E. It juts out into the Dover Strait, 4 m. N.E. from Dover. There are here two fixed lights which are visible at distances of 22 m. and 25 m. Near here was fought a naval battle in 1666, between the English under Albemarle and the Dutch under De Ruyter.

Forensic Medicine, *see* MEDICAL JURISPRUDENCE.

Foreshore, *see* SEASHORE and COAST PROTECTION.

Forest and Forest Laws. A forest is defined by Manwood, the old authority on the forest law, as being 'a circuit of woodes, grounds, and pastures, known in its bounds, and privileged for the abiding of wild beasts and fowls of forest, chase, and warren, to be under the king's protection for his princely delight.' According to Coke, the royal forests in his time appear to have been sixty-nine in number, while the origin of by far the greater part was lost in remote antiquity. The four principal forests in England were the New Forest, Sherwood, Dean, and Windsor. Among the others

were Epping (Essex), Dartmoor (Devon), Wichwood (Oxon.), Salcey, Whittlebury, and Rockingham (Northants), Waltham (Lincs.), and Richmond (Yorkshire). Professor Freeman has pointed out that afforestation in its older connotation had nothing to do with trees, and simply meant putting a tract of land outside the common law in order to secure for the king, by special laws, the freer enjoyment of the pleasure of hunting. The forests were the private property of the king, and trespassers were so barbarously punished, that one of the chief things insisted upon in the early national demand for the reform of the forest laws was the mitigation of the severe code of punishments. The policy of afforestation of William I. was continued by his immediate successors to the throne, but although the forests were strictly guarded by the Conqueror, no forest laws are attributed to him. Subsequently, in the reign of Henry I., a system of forest laws, with special courts for their administration, was established and developed by Henry II. These courts were: (1) the Court of Attachments, or Woodmote, held every forty days to punish offences against vert and venison (trees and covert and game); (2) the Court of Sweinmote, held three times a year, originally for business relating to agistment, but later to punish general offences under the forest laws; (3) the Court of Regard, held triennially, for the expeditation of dogs, *i.e.* the cutting of the claws in such a way as to prevent their use in hunting; and (4) the Court of Justice Seat, held before the itinerant justices of the forests for the trial of all causes connected with forests. Besides the justices, the officers were the wardens, verderers, foresters, agisters, regards, keepers, bailiffs, and beadles. The Assize of Woodstock of 1184 made attendance at the forest courts compulsory, and heavy fines were extorted for every breach of the forest laws. The first substantial concessions were those granted by Magna Charta, under which all forests made by John were to be disafforested, and all bad customs connected with forests abolished. Then came the Carta de Foresta of Henry III., the first separate charter of forests, which disafforested private lands improperly afforested, and abolished the punishments of death and mutilation for offences against the forest laws. This charter was confirmed by Henry III. in 1225, but so often infringed by him and Edward I. that the latter monarch had to promise and carry out reforms under the Articuli super

Cartas of 1300. From the time of the Confirmatio Cartarum of 1327 the forest laws began to fall into disuse, and the oppressive powers vested in the crown had almost ceased to be exercised at the time of the Stuart dynasty, when Charles I. revived them with the object of replenishing his empty exchequer by fines for trespass. This was one of the grievances to which the Long Parliament directed its attention, and from the passing of the 16 Car. I. c. 16, the whole forest organisation fell into a state of decay. In 1817 the offices of warden, chief justice, and justice in eyre of the forests were abolished, and the powers attached to these offices, relating mainly to the revenues of such royal forests as remain, were vested in 1829 in the Commissioner of Woods, Forests, and Land Revenues. In 1832 the powers of the commissioner passed to the predecessors of the present Commissioners of Woods and Forests, an emanation of the Commissioners of Works and Public Buildings. See FORESTRY.

Forestalling, originally the practice of buying goods before they reached the market in order to raise the price of them. There were laws against this practice, but they were repealed by statute 7 and 8 Vict. c. 24, and it is now considered a lawful way of trading. See ENGROSSING and REGRATING.

Forest City: (1) A tn. in Susquehanna co., Pennsylvania, U.S.A., 5 m. N. of Carbondale. Has silk mills and is a centre of a farming and mining district. Pop. 5209. (2) Also the name of three vils. in Colorado, Iowa, and N. Dakota.

Foresters, Ancient Order of, one of the larger friendly societies of the class designated 'affiliated' societies in the report of the royal commission of 1870, that is, having a central body to the funds of which the branch bodies or 'courts' contribute. The objects of this Order, which was established in 1834, are to secure to its members, their wives, husbands and other relatives or dependants weekly allowances during sickness or other infirmity, in old age (i.e. after 50), or in widowhood, also to provide sums at death or during unemployment or other distress and by way of endowment insurance. The Order administers the National Health Insurance Act through its Central Office, Districts and Court Branches (see on general objects of a friendly society, FRIENDLY SOCIETIES). For the carrying out of its objects the Order is constituted of some 4500 Courts and 224 Districts, disposed in various parts of the United Kingdom, colonies and foreign countries, each under its own

officers and a central body or headquarters established at 17 Russell Square, London, W.C.1. The governing body is a 'High Court,' which meets annually in the first week in August in a city or town chosen for the purpose by a preceding High Court. During the periods between each High Court the Order is governed by an Executive Council of eleven members, eight being elected for England, two for Scotland and one for Wales. The Council meets monthly. The Secretary to the Society is Stanley L. Duff. The Order has an approximate adult male and female benefit membership of 650,000. Members insured under the National Health Insurance Acts 675,000. Honorary Members 10,000. Members of junior sections and juvenile societies 200,000, while the Order assures 35,000 members' widows for death benefit. The total funds (including National Health Insurance Funds) exceed £20,000,000. The total annual income of the Order (exclusive of National Health Insurance Funds) is approximately £1,725,000, the total benefits paid being £925,000. Of this amount £650,000 is expended annually in sick pay, and payments at death are approximately £200,000. Members are entitled to a fortnight's stay at an approved Convalescent Home upon fulfilling the prescribed conditions. Facilities are also afforded to members to deposit surplus contributions with branches of the Order for investment and members are assisted to purchase their own houses by advances on mortgage upon approved securities. Provision is also made for insurance of widows and orphans. The sickness benefits vary in amount according to the rules of the individual branch, but normally they are for periods of 26 weeks full pay (the average rate being 12s. per week), 26 weeks half pay, and quarter pay for remainder of illness. Death benefits average £10 at death of member and £5 at death of member's wife, on payment of a contribution graduated according to age and actuarially certified to be adequate. It is also possible to obtain sickness and death benefits for as small a sum as one penny per week, while children can be admitted for death benefit from birth.

Forest-fly, see HORSE-FLY.

Forest of Dean, see DEAN, FOREST OF.

Forestry: Historical.—A forest may be described as an area set apart for the production of timber and other forest produce, or which is expected to exercise certain climatic effects or to protect a locality against injurious

influences. Probably the greater part of the dry land was formerly covered with forests which consisted of a variety of trees, and which were grouped according to climate, soil, and configuration of the several localities. When old trees reached the limit of existence they disappeared and younger trees took their place, and conditions for uninterrupted continuation of the forest were thus rendered favourable. The result of this was a healthy and vigorous production by the creative powers of soil and climate. The interference of man broke this continuous chain and

Burma, for example, there are thousands of species, while in Sind there are only ten species. In Central Europe exist forests of fifty species, while in N. Europe the forests contain only half a dozen. Generally speaking, however, it may be said that the Tropics and their adjacent countries of the earth unmodified by considerable elevation, contain broad-leaved species, such as palms, bamboo, etc. In these parts most of the hardest timbers, such as teak, ebony, and mahogany, are found. The N. countries, on the other hand, are rich in conifers. Just as the temperature



OLD FOREST OAKS IN ENGLAND

gradually the area under forest has been greatly reduced. Then the establishment of domestic animals showed the first decisive interference in the life of the forests. Forests were burnt down in order to obtain pasture and later for agricultural purposes. In modern times the ruthless cutting down of trees for timber is a menace to the already decaying supply of wood and other forest products.

Character and distribution of Forests.

—The character and distribution of the now remaining forests differ immensely. Generally speaking large forests consist of a number of different species of trees, but there are also forests containing trees of one species only. In most of the tropical forests hundreds of species are to be found on a comparatively small area. In

varies as one travels N. or S. from the equator, so, in travelling in the same directions, various characteristics of vegetation dependent upon climatic conditions may be seen. The countries between Central Africa and N. Europe exhibit nearly all the varieties of forest trees. S. and N. of the equator is a large belt consisting of hardwood. In the Sahara and on the Mediterranean coasts are forests of oak and cork. In Italy, the oak, olive, and chestnut are predominant, and ash, sycamore, beech, birch, and certain pine species may also be found. The Swiss and Ger. forests contain chiefly silver fir and spruce, and the Baltic countries produce forests of Scotch pine, spruce, and birch. In Siberia the forests consist of larch, hornbeam,

willow, and poplar. In India the forests are greatly influenced by elevation and rainfall. In districts where there is heavy rainfall the forests consist of evergreens, such as fig, palm, bamboo, and india-rubber trees. In districts where rainfall is less deciduous forests appear, such as teak, sal, and other valuable trees. Where the rainfall is very slight the vegetation is sparse, and places where rainfall is nil are desert. The Himalayas provide an excellent illustration of the effect of elevation upon the character of forests. Here are found forests which contain, according to the elevation, pines, firs, deodars, oaks, chestnuts, laurels, and bamboos. As the conditions vary from sub-tropical to arctic, so the character of the forest also varies. In Australia most of the trees belong to the eucalyptus genus. Over 200 species have already been found. Some of these trees reach an enormous height. In N. America tropical and sub-tropical forests consisting of evergreen broad-leaved species and pines are found. In the Atlantic region the forests consist of broad-leaved deciduous trees and pines. In Canada, larches, spruces, and firs are predominant. Proceeding W. from the Atlantic regions the forest changes into shrubby vegetation, and this into prairies. Towards the Pacific coast extensive forests of pine, larch, and fir are found.

Use of Forests.—Forests are absolutely indispensable to mankind both as regards their direct and indirect value. They are indirectly valuable through their influence on climate, stability of soil, regulation of moisture, healthiness and beauty of the country. Their direct value is through the produce they yield. Bare land is exposed to the full effects of the sun and air-currents, and the climatic conditions produced by these agencies. Land which is covered with a growth of plants, and especially with dense forest, enjoys the benefits of certain agencies which modify the effect of sun and wind upon soil. The chief of these modifying agencies are: (1) Crowns of trees which intercept the rays of sun and falling rain and reduce radiation at night; (2) leaves, flowers, and fruits, together with certain plants which grow in shade of trees, form a layer of mould: this protects the soil against rapid change of temperature and greatly influences the movement of water in it; (3) roots of trees bind the soil together. By careful experiment the following results, proving the utility of forests, have been obtained: (1) Forests reduce the temperature of air and soil to a moderate extent and render

climate more equable; (2) they increase the humidity of the air and reduce evaporation; (3) they tend to increase the precipitation of moisture; (4) they help to regulate the water supply, tend to reduce violent floods, and produce a more sustained feeding of springs; (5) they assist in preventing denudation, erosion, landslips, and avalanches; (6) under certain conditions they improve the healthiness of a country and help its defence; (7) they increase the beauty of a country and tend to produce a healthy aesthetic influence upon people.

The direct utility of forests is due (1) to the produce they yield; (2) to the capital they represent, and to the work they provide. The produce consists of timber and firewood, which are both necessities for the daily life of people. Conifers are the most important timber trees for economical purposes. They are found in large quantities in the Baltic provinces and in N. America. Iron now serves in many ways, particularly in the building trade, where timber was once used, and coal largely takes the place of firewood. Wood, however, has displaced other materials. About one and a half million tons of wood pulp are imported into Great Britain annually, of the value of about ten million pounds sterling. Spruce wood is now used to manufacture a fabric closely resembling silk. The minor products of the forest are numerous and essential to mankind. The yield of fodder is of the utmost importance in countries which are subject to periodic droughts. In many places it is impossible to grow field crops successfully without leaf mould and brushwood. The industries maintained by products of forests are numerous and include commercial fibre, tanning materials, dyestuffs, lac, turpentine, resin, rubber, and gutta-percha. The United Kingdom imported during 1929 wood and timber to the value of £45,827,975 in addition to £17,273,095 rubber and £13,148,675 paper-making material. Beyond these, goods manufactured from forest products totalled over £28,000,000. In Russia and in other N. countries the people are largely dependent on the produce of forests. Their houses are almost universally made of timber; wood is everywhere used for fuel, and they employ a slip of birch-wood, which is lighted, as a candle. Potash, which is made from the ashes of burnt trees, is exported in large quantities. For the purpose of tanning, the Russians employ not merely the bark of the oak, but also that of the birch and willow. From the wood of the

birch they procure a species of tar, which is used in dressing that kind of leather commonly known by the name of Russia leather, and much employed in bookbinding.

The capital employed in forests consists chiefly of the value of the soil and the growing stock of timber. The latter is generally of much greater value than the former. The rate of interest yielded by capital invested in forests may under proper management be placed equal to that yielded by agricultural land. Forests require labour in many ways, such as (1) formation, tending, and harvesting; (2) transport of forest produce; and (3) industries which depend on forests for their chief material. In the first department of forest labour the number of men employed is less than that required on agricultural land. Transport of produce forms a business of considerable size and the amount of labour is equal to about one-half of that in the first department. The greatest amount of labour is required in the manufacture of raw materials yielded by forests. One industry, that of chair-making at High Wycombe, Bucks, employs over 20,000 workmen. The beautiful beeches of the adjoining country are converted into chairs and furniture of many patterns. One great feature of forest work is that it can be done at seasons when field crops do not require attention, thus fitting in admirably with agricultural work. The utility of forests depends largely on the position of the country and its control over other countries. Other factors are: (1) the value of land and labour; (2) the density of the pop.; (3) the amount of capital available for investment; (4) the climate and configuration of the land and its geographical position.

The Supply of Timber.—The extent of land under forest varies in the different countries, and thus some countries are able to export large quantities of timber, while others are forced to import the necessary quantities. The chief producing countries of Europe in their order are Russia, Sweden, Finland, Germany and France. All the other countries have either only enough for home consumption, or import timber. W. Africa exports hardwoods and imports coniferous timber. Cape Colony and Natal import considerable quantities of pine and fir wood, and some oak. Australia exports hardwoods, and New Zealand, Kauri pine, and they import larger quantities of light pine and timber. The United States of America import nearly as much from Canada as they export. Canada exports large quantities of

timber. The quantity of land under forest in the Dominion amounts to more than 1,025,000 sq. m., or 31½ per cent. of the whole area. There is enormous forest wealth, with which she might supply nearly all the other countries deficient in material. The policy of the Dominion and Provincial govts. is to dispose of the timber by means of licences to cut, rather than to sell timber outright, thus retaining the ownership of the land and controlling cutting operations. Protection of timber from fire is afforded by each of the Provincial govts. maintaining an organisation which co-operates with owners and licencees of timbered areas. The most important single development in forest fire protection in late years has been the use of aircraft for the detection and suppression of forest fires. The most valuable timber, the white pine, is gradually being exhausted, great forests of spruce are being rapidly destroyed, and forests of Douglas fir have been attacked for export to the U.S.A., and other countries. In comparing stocks of the various countries it has been found that a sufficient quantity of hardwoods is available, but the only countries which are able to supply coniferous timber for export on a large scale are Russia, Sweden, Norway, Austria, Hungary, and Canada. Thus these countries have practically to supply the rest of the world, and as the management of their forests is quite unsatisfactory, the question of supplying light pine and fir timber must become a very serious matter before many years have passed. Distinct signs of the coming crisis are everywhere visible, and the question becomes of greater moment when one reads that 87 per cent. of all timber imported into Great Britain consists of light pine and fir. Great Britain does not stand alone in this respect, but the other importing countries are similarly situated. In some countries there is no room for extension of land under forest, but in Great Britain and Ireland no such plea can be made. There are about 2,000,000 acres of waste land, and about 12,500,000 acres of mountain and heath land generally used for light grazing. If one quarter of that area were placed under forest it would produce all the timber now imported which can be grown in Great Britain, that is to say, about 95 per cent. of the total. The serious encroachments made upon British forests during the Great War, in order to supply enormous quantities of wood for trench-supporting purposes, and the presence of numbers of Canadian lumber men created wide national interest in afforestation.

tion, with the consequence that a F. Commission was set up by the Forestry Act of 1919. It is the duty of the Commissioners to promote the interest of F. and develop afforestation with the aim of increasing the supply of timber in Great Britain. The former Crown Woods were passed into the care of the Commission, and in addition the Department has acquired over 600,000 acres of land of which 163,000 have already been planted. Adequate grants are supplied by the gov. The gross estimated outlay for 1930-31 was

land is the wych elm, a different species, growing in a more straggling form, with pendent branches, and a larger leaf. Its wood is very unlike that of the Eng. elm, and more resembles that of the ash. In the approaches to some of the royal palaces in Spain are some rows of elms, which, we are assured by Evelyn, were transplanted from England by Philip II., husband of Queen Mary of England, the elm not being a native of Spain. In addition to the above-mentioned trees, the ash, the maple, the sycamore, and small-



MATURE SCOTCH PINE

£991,380 and the estimated receipts £153,580. The Chairman of the Commission is Sir John Stirling Maxwell.

British Forests. The oak and the beech are natives of Great Britain. The elm was introduced at an early date. Each of these trees has its appropriate soil. In the W. part of the county of Sussex we have two distinct belts of country, each strongly marked by the character of its vegetation. To the N. there is a strong and deep clay, admirably adapted to the growth of oak. Then come the chalk hills where the luxuriant growth of the beech attests that this tree has found its congenial soil. The elm is not met with N. of Stamford in Lincolnshire. The elm seen in Scotland and the N. of Eng-

leaved lines may be enumerated as growing wild in Great Britain. The chief forests of England are the New Forest, the Forest of Dean, Ashdown Forest, and Epping Forest. *The New Forest* was originally a royal forest. The origin of royal forests is lost in antiquity. There are said at one time, in England alone, to have been sixty-eight forests in the possession of the Crown. All the sixty-eight forests have long ago been disafforested, in the sense that the sovereign has no longer the privilege of maintaining deer and other game in them for sport, protected by special laws and tribunals. A few only exist in the popular sense of the term, that the land is still uncultivated and covered wholly or

partially by woods, such as the New Forest, the Forest of Dean, Epping Forest, Windsor Forest, and the Forest of Dartmoor. The New Forest (Hampshire) was created by William the Conqueror, who in doing so, is popularly believed to have devastated a wide district of cultivated land, demolished churches, and converted the land to the use of wild animals. The forest now practically consists of 65,000 acres, of which a little over 2000 are the demesne lands of the Crown, inclosed and cultivated, and the residue belongs to the Crown, but subject to the rights of common of a large body of owners and occupiers of cultivated lands in the neighbourhood of the forest. *The Forest of Dean*, of about 19,000 acres in extent, is another of the few remaining royal forests, which has come under the consideration of parliament in recent years, and where the policy of maintenance has prevailed over that of inclosure. The forest lies in the Hundred of St. Briavel, between the estuary of the Severn and the R. Wye, about twelve miles from Gloucester. The Crown is the owner of the soil and of all the timber growing on it. Of the forest, about 4000 acres consist of heath and open land; the residue is planted with oak trees. *Epping Forest* consists of a little over 6900 acres of woodland, open to the public at all points, extending for a distance of nearly 13 m. from Wanstead, on the confines of London, to beyond the village of Epping, with an irregular breadth at its widest part of about 1 m., and in its narrower parts of about half a mile. It is densely covered with timber consisting of hornbeam, beech, and oak trees. See AFFORESTATION and FOREST.

Forestry Commissioners, a body corporate appointed quinquennially under the Forestry Acts 1919-27 and charged with the general duty of promoting the interest of F., the development of afforestation, and the production and supply of timber in Great Britain (see also AFFORESTATION).

Forez, a former county of France, partly corresponding to the dept. of Loire. It was united to the crown under Francis I. in 1532.

Forez, *Monts du*, mountains in France, forming a branch of the Auvergnès. They are situated between the rivers Altier and Loire. Highest peak, *Pierre sur Haute* (5380 ft.).

Forfar, the cap. of Forfarshire, is a royal and parl. burgh of Scotland. It is situated in the valley of Strathmore, 13 m. N.N.E. of Dundee. Its chief industry is the linen manufacture; there are also jute factories,

tanning works, iron foundries, bleaching works, and breweries. F. was a royal residence of Malcolm Canmore and his Queen Margaret. David I. made the town a royal burgh in 1124-53, and in 1308 Robert Bruce destroyed the castle. F. unites with Montrose, Arbroath, Brechin, and Inverbervie in returning one member to Parliament. Pop. 9587.

Forfarshire, or **Angus**, a maritime co. of Scotland, bounded by Aberdeen and Kincardine on the N., the North Sea on the E., the Firth of Tay on the S., and Perthshire on the W. It has an average length of 35 m. and a width of 25 m., and an area of 885 sq. m. The surface is varied; the Binnchinn Hills lie in the N., and between the heights are fertile valleys. The Sidlaw Hills, rising to 1300 ft., run parallel to the former range, and between these two systems stretches the wide valley of Strathmore. The chief streams are the Isla and the N. and S. Esk; the lochs are Forfar, Lee, Balgavies, etc. Sandstone and granite are quarried in the hills. Wheat is grown extensively in the valley of Strathmore; oats and potatoes are other crops cultivated. The salmon and herring fisheries are important; but the chief industry is the flax and jute manufacture, Dundee being the seat of the linen trade. At Carnoustie and Monifieth on the coast there are noted golf links. The chief towns are Forfar (the capital), Dundee, Arbroath, Montrose, Brechin, etc. Pop. (1921) 271,000.

Forfeiture: (1) Denotes the divesting of property or the loss of rights entailed by law as a consequence of some crime or breach of condition. Formerly any conviction and attainder (*q.v.*) for treason or felony was followed by the transfer to the crown or the feudal superior of the person convicted of all his lands and goods. Since the passing of the Forfeiture Act, 1870, F., in this sense of the word, may be said to be practically obsolete. By that Act it is provided that no conviction for any treason, felony, or *felo de se* shall cause any attainder, forfeiture, or escheat. But the Act does not affect the consequences of outlawry or the putting of a person outside the protection of the law for refusing to make himself amenable to legal process. Apparently F. may still follow on conviction for misprision of treason (*q.v.*). But the Forfeiture Act further provides that the property of a convicted felon may be committed to the custody and management of an administrator appointed by the court, or in default of such administrator, to the management of an interim curator appointed

by magistrates on an application made on behalf of the convict or his family. The management of the convict's estate, whether by an administrator or curator, is, of course, entirely in the interests of his family; but the Act allows the court to order a convicted felon to pay a sum not exceeding £100 as compensation for loss sustained by any person in consequence of the felony. But a conviction for treason or felony, where the sentence is at least imprisonment for more than twelve months, or if less, with hard labour superadded, entails the loss of any military, naval, or civil office, or any other public employment or ecclesiastical benefice or pension or superannuation allowance, unless a pardon is received within two months after conviction, or before the filling up of the office if the pardon comes at a later period. Furthermore, sentence completed, the felon until pardoned is debarred for the future from the above offices, and from sitting in parliament or exercising the parliamentary or municipal franchise. (2) F. also denotes the loss of land or hereditaments consequent on a breach of covenant between landlord and tenant. But the right to take advantage of a F. may be waived by any act of the landlord which recognises the continuance of the title of the tenant, as *e.g.* the acceptance of rent by him in respect of a time subsequent to the act by which the F. was incurred. Equity, however, has for long given a tenant a right to apply for relief upon certain terms, such as payment of compensation to the landlord. (3) F. in the language of statutes is used to denote 'penalty' (*see FINE*). (4) The term is now used to denote the seizure by revenue officers, the police, or other authorised persons, of goods in regard to which some breach of the law has been committed. (5) Failure to perform the condition of a bond on the part of the obligor (*see BOND*) formerly entailed a penalty. Equity, however, has long relieved the obligor from F. of anything more than the other party was in conscience entitled to be paid. The like observations apply to the case of foreclosure as between mortgagor and mortgagee. (6) As to F. of contraband of war, *see* DECLARATION OF LONDON. Other uses of the term, such as F. of marriage—the penalty imposed on a ward who married contrary to the wishes of a guardian—and F. for waste of a freehold inheritance, have become obsolete. *See also* CONFISCATION.

Forged Transfer Acts, 1891 and 1892. These Acts empower a company to make cash compensation out

of its funds for any loss occasioned by a forged transfer of its shares or stock, or by a transfer under a forged power of attorney. It is always desirable to set aside a fund exclusively for such compensation, because the title of the true owner of shares can never be affected by a forged transfer, and he can always compel the company to recognise him as the holder of the shares so transferred, and to cancel the forged transfer. The Acts enable a company to form a compensation fund by insurance or out of reserve capital, or in any other way it may resolve upon; and it may also borrow on mortgage to effect the same object. If the company elects to create the fund by insurance it may do so by charging transfer fees not exceeding one shilling per £100, and not less than threepence. The Acts also empower a company to guard itself against loss from forged transfers by imposing reasonable restrictions on the right to transfer shares or stock, as *e.g.* by giving the directors the right of veto. *See* Buckley on *Companies and Limited Partnerships Acts*, and Palmer's *Company Law*.

Forgery, the falsification or alteration of any document or writing with intent to defraud. The crime is only a misdemeanour at common law; but as commerce developed and paper credit became proportionately extended, many Acts were passed enumerating the most important classes of commercial and official documents, and making it a felony, punishable in most cases with penal servitude for from three years to life or imprisonment not exceeding two years, not only to forge or alter but also to alter or 'put off' any such document knowing the same to be forged. There can be no conviction for statutory F. unless the instrument purports on the face of it to be valid for the purposes for which it was created; hence a forged cheque with no signature to it will sustain at most only a charge of F. at common law. F. only applies to documents in writing, therefore passing off a counterfeit picture for that of a particular artist by painting his name in the corner is not F., though it may constitute obtaining by false pretences. F. implies a general intent to defraud and not necessarily an intent to defraud any particular person. It may be noted that an instrument may be a F., even though the forger has put his own name to it, *e.g.* if A transfers shares to B, and subsequently with a fraudulent intent purports to assign the same shares to C by a signed transfer, the latter instrument is a F.

Literary forgery means the passing off of spurious literature as the work

of well-known writers. See LITERARY FORGERY.

Forget-me-not, the popular name of *Myosotis palustris*, a plant belonging to the Borage family. It grows abundantly in damp places throughout Britain, and flowers all through the summer and autumn. The stem is succulent and grows to about a foot in height. The flowers are blue and have a five-cleft calyx. Several other species of *Myosotis* are common, and many are cultivated in gardens; *M. alpestris* is a rock plant and *M. lithospermifolia* has the largest flowers of the species.

Forging, see ANNEALING; WELDING.

Forio, a seaport and com. of Italy on the island Ischia, in the circle and 16 m. W.S.W. of Pozzuoli. It is noted for its warm mineral springs. Pop. 7200.

Fork, an implement used for different purposes and having two or more points or 'prongs.' The various kinds of F. include table-Fs., pitch-Fs., hay-Fs., and tuning-Fs. The table-F., which does not seem to have been used in England before the reign of James I., is made of various materials, such as silver, silver plate, 'white metal,' and steel. The making of Fs. consists first in forging the tang, shoulder and shank, and the piece from which the prongs are made. The other processes are the grinding, polishing, and hating or fitting into the handle. The hay-F., used for turning and tossing hay, and the pitch-F. used as a garden implement have long wooden handles—occasionally short ones—and usually two prongs called 'tines.' There is also a three-pronged F. used for some purposes in agriculture. The tuning-F., made completely of metal, has two prongs and is used to produce a certain note of music when a particular 'pitch' is desired. The method of producing this note is that of striking the tuning-F., which vibrates and produces the required sound.

Forlì: (1) A prov. of Italy in the div. of Emilia, Central Italy. Area 725 sq. m. Pop. 299,882. (2) The cap. of the prov. of the same name, situated about 40 m. S.E. of Bologna, and at the foot of the Apennines. Its cathedral (San Girolamo) and churches are noteworthy on account of their works of art by Cignani, Guido, and others. It also contains an art gallery and a citadel dating back to 1361, and now used as a prison. Its manufactures are varied, including silk and cloth. The town itself is said to have been founded during the third century B.C. Pop. about 43,700.

Form, in music, means the plan upon which a piece of music is con-

structed. Two qualities are essential in the form of a composition for it to be pleasing—unity of design and variety of melody. Sonata F. is generally in three movements, a slow first movement, a quick second, and a slow third, and if a fourth a scherzo. Rondo F. consists of one principal subject, occurring three times, with contrasting episodes between, as Haydn's Pianoforte Sonata IX. in D.

Formaldehyde (H·CHO), one of the organic substances called aldehydes which are formed when the primary alcohols lose two atoms of hydrogen, hence alcohol *dehydrogenatum*. F. is prepared by oxidising methyl alcohol by passing air saturated with the alcohol vapour over red-hot platinised asbestos. It is a gas at ordinary temperatures, condensing at -21° C. It rapidly decomposes to form metaformaldehyde, a crystalline compound. When the metaformaldehyde is heated, F. is again formed, which decomposes once more on cooling. When the aqueous solution of F. is evaporated, the F. is converted into paraformaldehyde, an amorphous substance. All three substances have the same percentage composition, so that they form an example of polymerisation. F. occurs in the chlorophyll cells of plants, and is an effective germicide. *Formalin* is a trade product, consisting of an aqueous solution containing about 40 per cent. of F.; it is much used as an antiseptic.

Formalin. A solution obtained from formaldehyde (*q.v.*) which has great powers of deodorising and preserving various substances. The former fact makes it a particularly unsuitable medium for preserving foodstuffs, where the odour is often the chief check the consumer has upon the good or bad quality of an article, none the less it is largely used on the Continent for this purpose. F. is used in many industries because of its chemical effect upon soft substances, and is also of value in some important secret processes. It is also a powerful antiseptic and disinfectant.

Formalism (in philosophy). According to Kant those qualities and determinants which fix the arrangement of matter, and thus invest a thing with identity. Formalism becomes a kind of enhanced idealism. Aristotle says that in organisms an individual has two aspects: matter, out of which he is emerging, and form, into which he is passing. Thus everything is matter, and the potentialities of the individual thing which impel it to its reality are its form. The Form is therefore immanent. In Reason, matter cor-

responds to the Passive Reason, while Form is the Active Reason. In art Form is the third of the four causes, material, efficient, formal and final. Advanced formalism actually denies the existence of matter and recognises form only.

In religion F. stands for excessive devotion to formal precedence and observance, as distinct from the spirit.

Formia, a city, situated in the S. of Italy in the prov. of Caserta and on the Gulf of Gaeta; its original name being Mola di Gaeta. It was an old Roman town, its name then being Formiæ, and it still contains the remains of villas formerly inhabited by Roman nobles including Cicero. It was also famous for its wines. Pop. 8500.

Formic Acid, a fatty acid, being a derivative of methyl alcohol or formaldehyde. It is a colourless liquid of specific gravity 1.24; it solidifies at low temperatures, melting at 8° C. and boiling at 101° C. It has a powerful irritating odour, and blisters the skin on contact. It occurs in nature in nettles, ants, and other stinging creatures, and owes its name to the ant (*formica*), whose irritating sting is due to the secretion of F. A. The molecular formula of F. A. is CH_2O_2 , and the substance may be prepared by heating oxalic acid with glycerin. The salts of F. A. are termed formates and may be prepared by neutralising the acid with the appropriate alkalis, hydrates, etc.

Formic Ether, or Ethyl Formate, an ester of formic acid. It may be prepared by treating formic anhydride with alcohol. Its formula is $\text{H}.\text{CO}_2.\text{C}_2\text{H}_5$; it is a colourless liquid with a pleasant peach-like odour, boiling at 55° C. Like many of the esters of organic acids, it is used as a perfuming and flavouring agent in the preparation of sweets, etc. It is also used as an ingredient of a kind of rum.

Formidable, the name of a British battleship. It was torpedoed and sunk by the Germans on Jan. 1, 1915.

Formosa, a large and important island of the Western Pacific, which, until 1895, formed part of the Chinese empire when it came into the possession of the Japanese, and is known under the name of Taiwan. The island is 225 m. long and from 60 to 80 m. broad, and is about the same size as Kiushiu, one of the four chief islands forming the Japanese empire proper. F. is regarded by some as a link in the chain of volcanic islands which form the eastern escarpment of a former Malayo-Chinese continent. The backbone of the island, extending N. and S., is formed of a range of densely wooded mountains,

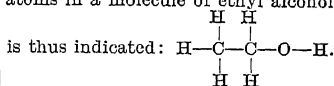
of which the highest peak is Mt. Morrison (14,270 ft.), and the second Mt. Sylvia (12,480 ft.). E. of this, the country is mountainous, terminating in a precipitous coast and a few rocky islands. The W. coast presents a remarkable contrast to the bold rocky face of the E. It consists of a broad, alluvial plain seamed by a number of water channels and terminating at the coast-line in sand-banks. The land on this side, is regularly gaining on the sea probably owing to the sediment brought down from the mountains by water-courses during the rainy season. The climate is damp, hot, and malarious, and on the whole very trying to many people. The driest and best months in the N. are October, November, and December. Violent typhoons are very common at certain seasons in the sea immediately S. of F. The island is famous for the rich luxuriance of its vegetation. Orchids and other ornamental plants of F. enrich our European greenhouses. There is also a profusion of ferns, fern-trees, camphor, bamboos, pines, palms, and banana trees. The pineapple, too, grows in abundance. Of animal life, there are at least three kinds of deer, wild boars, monkeys, flying squirrels, and at least forty-three species of birds peculiar to the island. Noxious wild animals are few. Little is known of the geology of the island. Gold is obtained in the Kelung dist., and bituminous coal and sulphur abound. Petroleum and natural gas are also found, but are undeveloped. The chief industry is agriculture, carried on by the Chinese settlers, and camphor, tea, and sugar are the staple products. Area 13,458 sq. m. The population numbers 3,994,236, consisting of the aborigines, Chinese settlers, and about 42,000 Japanese. See Henri Cordier's *Bibliographie des Ouvrages Relatifs à l'île Formosa*, 1903. The colony is self-supporting and although at first there were many endeavours to form a republic, the Japanese rule is now accepted without demur, and the area is peaceful. The annual imports are of the value of 205,000,000 yen, the exports 271,000,000 yen, and the budget of 1929 was estimated to balance at 109,000,000 yen. The population of the capital, Taikoku, is 219,566.

Formosa: (1) A ter. in the Argentine Republic, S. America, in the extreme N. It lies between the rivers Pilcomayo and Bermejo. The estimated area is 41,402 sq. m.; pop. 21,880. This territory forms part of the great Chaco plain. Not very much is known about the region, except that it is covered with forests

and in large sections liable to inundations; the summer rains lasting from October to May. (2) F. is the chief tn. situated on the Paraguay R. It was founded after the defeat of the natives of Chaco by General Victoria in 1884-5. Pop. 10,000.

Formula, in chemistry, a collection of symbols which indicates the composition and certain other characteristics of a substance. Each element is represented by a letter or two letters derived from the English or Latin name; thus O is an abbreviated form of oxygen. Hg stands for mercury (Latin *Hydrargyrum*). But the symbol not only stands for the name of the element, it also represents a definite weight. This weight is known as the atomic weight of the element, and it indicates the smallest quantity of the element that is known to enter into chemical composition, measured in terms of the atomic weight of hydrogen as unit. When two or more symbols are placed in juxtaposition, the resulting F. indicates that the elements are in chemical combination in the proportions shown by their atomic weights. Thus H_2O represents water, and indicates that 2 parts by weight of hydrogen are united to 16 parts of oxygen, 16 being approximately the atomic weight of oxygen. A figure placed to the left of a F. applies to the F. as a whole. Thus, in the equation $3NO_2 + H_2O = 2HNO_3 + NO$, we have indicated the fact that 138 parts of nitrogen peroxide react with 18 parts of water to produce 126 parts of nitric acid and 30 parts of nitric oxide. In the formula NO_2 , N stands for 14 parts of nitrogen and O for 16 parts of oxygen; NO_2 therefore represents 46 units of weight, while $3NO_2$ means three times that quantity. A F. which simply indicates the respective proportions of the elements is called an *empirical* F. Thus, H_2O and H_2O_2 might both serve as empirical formulæ for water, as they represent the same ratio of the weights of hydrogen and oxygen when H is understood to indicate 1 unit and O 16 units of weight. In every quantity of the same chemical compound the constituent elements are in an invariable ratio. The smallest portion of matter that can exist by itself is called a molecule, and in the molecule of a compound the same invariable ratio of the quantities of the elements is maintained. Each element of the compound is present in every molecule in the form of one or more atoms, and it is desirable that the F. of a substance should represent the actual numbers of the atoms of each element in the molecule. Such a F. is called a *molecular*

F., and in order to obtain it the molecular weight of the substance must be found. The estimation of molecular weight is based on the hypothesis of Avogadro, who suggested that equal volumes of all gases at the same temperature and pressure contain the same number of molecules. By finding the density of a gas, that is, the ratio of its weight to the weight of an equal volume of hydrogen under the same conditions of pressure and temperature, we find also the ratio of the weight of a molecule of the gas to that of a molecule of hydrogen. As other considerations have led to the conclusion that a molecule of hydrogen contains two atoms, it follows that the molecular weight of a substance is twice its vapour density. The importance of molecular weight in this connection is seen from the following example. Formaldehyde, acetic acid, and lactic acid have the same empirical formula CH_2O . The molecular weight of formaldehyde is 30, that of acetic acid 60, and that of lactic acid 90. Assuming from other evidence that the atomic weight of carbon is 12 and that of oxygen 16, it follows that the number of atoms in the molecule must be represented as CH_2O for formaldehyde, $C_2H_4O_2$ for acetic acid, and $C_3H_6O_3$ for lactic acid. Among organic compounds there are many cases of different substances with the same molecular F., but with different physical and chemical characteristics. This is explained by assuming a difference of structure or arrangement of the atoms in the molecule, and another form of F. is necessary. The disposition of the atoms in a molecule of ethyl alcohol



is thus indicated: $\text{H}-\text{C}-\text{C}-\text{O}-\text{H}$. This is called a *graphic* F., and shows that one carbon atom is directly united with three hydrogen atoms, the second carbon atom with two hydrogen atoms, and the oxygen atom with one hydrogen atom. This linking of atoms agrees with the behaviour of organic substances, as in chemical action the atoms tend to be replaced in groups. The same information is conveyed by the more concise *structural* or *constitutional* formula, $CH_3\cdot CH_2\cdot OH$.

Forres, a royal burgh of Elginshire, Scotland. Close to this town on Cluny Hill is built a hydropathic establishment. There is also a tower erected in honour of Nelson, and an ancient obelisk. Pop. 4669.

Forrest, Edwin (1806-72), an American tragedian b. in Philadelphia,

and of Scottish and Ger. descent. He made his first public appearance in 1820 in Philadelphia in the part of Douglas in Home's tragedy of that name, and in 1826, after close study and advancement in his profession, he made a decided triumph at New York in the character of Othello. He crossed to England in 1836 and entered on a season at Drury Lane Theatre, London, where he achieved distinction in the Shakespearian rôles of Macbeth, Lear, Othello, and Richard III. He finally returned to the New York stage, and his last appearance was in 1871. See Rees, *Life of Edwin Forrest*, and Barrett, *Edwin Forrest*.

Forrest, Baron, John Forrest, first baron Forrest of Bunbury (1847-1919). Australian explorer and statesman, son of William F. Educated at Perth, W. Australia. At the age of twenty-two, after four years' service in the State survey department, he was sent in charge of an expedition to seek for traces of the lost explorer Leichhardt. Five years later he explored the colony of W. Australia from Champion Bay to Port Darwin, being awarded for this and his other journeys the gold medal of the Royal Geographical Society and other honours, together with a large grant of colonial land. In the ensuing fifteen years he held many official posts in the colony, including that of commissioner of crown lands; and on the attainment by W. Australia of responsible government, for which the colony was largely indebted to his exertions, he became its first Prime Minister, and held office for over ten years, during which the colony saw the most marked development. In his term as Premier important gold discoveries were made in W. Australia, and it was to his vision and determination that the colony owed the Fremantle harbour works, the projection of railroads to the mining districts, the goldfields water scheme and its excellent land laws. He represented his colony in the Federal councils, and from 1901 till his death sat for the Swan constituency. He held many ministerial posts in the Federal parliament, including those of Treasurer and acting Prime Minister, the latter in 1907. He was Treasurer again under W. M. Hughes in 1917, but retired the following year, and *d.* in September, or only six months after his peerage was conferred upon him. Published *Explorations in Australia* (London), 1875.

Forrest, Nathan Bedford (1821-77), a soldier, was *b.* near Chapel Hill, Tennessee. On joining the Confederate army after the beginning of

Civil War in America, he became a commander of the cavalry and did some distinguished service for his country. Military men rank him as one of the greatest natural cavalry leaders who has lived. In the campaign of 1862 he made a dash across the state of Tennessee and for two weeks cut General Grant off from communication with the world and seriously delayed the advance on Vicksburg.

Forskal, Peter (1732-63), a Swedish botanist. In 1761 he was chosen by the King of Denmark to join the scientific expedition to Arabia, and here he collected several hundred plants, previously unknown, and published a 'Flora' at Malta. He *d.* on his return journey from Arabia, having contracted the plague. His papers, etc., were published by Niebuhr under the titles: *Descriptiones Animalium, Avium, Amphibiorum, Piscium, Insectorum quæ in Itinere Orientali observavit P. Forskal*, 1775; *Flora Egyptiaco-Arabica*, 1775, etc. The genus 'Forskalia' is called after him.

Forst, a. tn., situated in Brandenburg, Prussia, E. of Kottbus, on the Lt. Neisse. It is chiefly engaged in the manuf. of woollen cloths. Pop. about 35,000.

Förster, Friedrich Christoph (1791-1868), a Ger. historian and poet, and brother of the painter Ernst Joachim F., *b.* at Münchengosserstadt. He first devoted himself to the study of æthology, and the history of art, but on the outbreak of the War of Liberation, in 1813, joined the army, where he quickly attained to the rank of captain, and by his fiery war-songs stirred up his countrymen against the Fr. On his return to Berlin, he taught in the school of artillery and engineering for a short time, and in 1829 became custodian of the Royal Art Museum with the title of court councillor. F. was connected with various journals and was the founder and secretary of the *Wissenschaftlicher Kunstverein* in Berlin. His principal works are: *Beiträge zur neuen Kriegsgeschichte; Albrecht von Wallenstein; Wallenstein's Prozess*, etc. He also wrote a number of poems, and adapted several of Shakespeare's plays for the theatre.

Forster, Sir Henry William Forster, First Baron, of Lepe, co. Southampton; *b.* January 31, 1866; second son of Major John F., of Exbury Ho., Hants, and of Southend, Lewisham. Educated at Eton; and New College, Oxford. Played cricket in Eton XI.; in Oxford XI. against Cambridge, 1887-89; also in Hampshire XI. Elected president, Marylebone C.C.,

1919. Foremost among golfers in House of Commons when a member there (Conservative)—for Sevenoaks, 1892-1918; for Bromley, 1918-19. A party whip, 1902-05. Financial Secretary to War Office and member of Army Council, 1915-19; sworn of Privy Council, June 1917. Ennobled Dec. 12, 1919. G.C.M.G., 1920. Gov.-general of Australia, 1920-25—during this term, he visited Papua and the Admiralty Islands. Fellow of New College, 1926. A director of the Australian, Mercantile, Land, and Finance Co., Ltd.; the London board of the Australian Mutual Provident Society; the Clitheroe Estate Co., Ltd., and the English, Scottish, and Australian Bank, Ltd.

Forster, Hugh Oakeley Arnold, see ARNOLD-FORSTER, HUGH OAKELEY.

Forster, Johann Georg Adam (1754-94), eldest son of Johann Reinhold F., b. near Danzig. At the early age of seventeen he accompanied his father on Cook's second voyage, and published an account of the expedition. He was for several years professor of natural history at Vassel and Wilna respectively, and then became librarian to the elector of Mainz in 1788. His writings, of which the most important are *Ansichten vom Niederrhein*, and *Beschreibung einer Reise um die Welt*, rank high amongst Ger. works descriptive of nature. F. has a style and has the great art of presenting objects from their most interesting and attractive side—qualities conspicuous in all his writings. His *Letters* were published by his widow in 1829 (2 vols.). See J. Moleschott, *G. Forster, der Naturforscher des Volks*, 1874; A. Leitzmann, *G. Forster*, 1893, etc.

Forster, John (1812-76), biographer, at an early age became a contributor to the newspapers and reviews. At the age of twenty he was appointed dramatic critic to the *True Sun*, and two years later edited the short-lived *Reflector*, to which his friends Lamb and Leigh Hunt contributed. During this period he did much journalistic work, but his ambition was to write books, and between 1836 and 1839 he wrote the *Lives of the Statesmen of the Commonwealth*. In 1846 he was for a few months editor of the *Daily News* in succession to Dickens, and in the next year he became editor of the *Examiner*. His admirable *Life and Adventures of Oliver Goldsmith* appeared in 1848. Being appointed in 1855 Secretary to the Commissioners of Lunacy, he at once gave up journalism, and devoted himself to more serious labours. His best-known work is his biography of Dickens (1872-74), which, in spite of

many defects, still ranks as the standard authority.

Forster, John Cooper (1823-86), a surgeon, was b. at Lambeth. After being a student at Guy's Hospital he became demonstrator of anatomy there in 1850, assistant-surgeon five years later, and surgeon in 1870. In 1880 he sent in his resignation from the post of senior surgeon, and from 1884-85 was president of the College of Surgeons, and will be remembered as the first man to perform gastrostomy in England. He wrote *The Surgical Diseases of Children*, 1860. See *Guy's Hospital Reports*, vol. xlv., 1887, by W. H. A. Jacobson.

Forster, William Edward (1818-86), was of Quaker ancestry, and remained a member of the Society of Friends until his marriage in 1850 with a daughter of Dr. Arnold. He was brought up to go into business, and in 1842 became a partner in a firm of woollen manufacturers that, after overcoming initial difficulties, became a very prosperous concern. Even before this, however, his interest in public affairs had shown itself, and he became acquainted with the leaders of different movements, such as Thomas Cooper, Robert Owen, and F. D. Maurice. He became Liberal member for Bradford in 1861, and held the seat until his death. He made his mark in Parliament early, and in 1865 was appointed Under-Secretary for the Colonies. He became Vice-President of the Council three years later, and was given charge of various Bills, which he piloted successfully through the House. Upon Gladstone's resignation, in 1874, he was proposed as Leader of the Opposition, a position which eventually Lord Hartington accepted. Upon Gladstone's return to power, in 1880, he became Chief Secretary for Ireland, but resigned two years later. He did not again hold office. There is a biography by Sir T. Wemyss Reid (1888).

Forsyth, Alexander John (1768-1843), an inventor, b. in Aberdeenshire. After the death of his father he became the minister at Belhelvie, Aberdeenshire, and about the year 1806 invented the percussion lock, which secret Napoleon offered to buy for £20,000, but was refused. See Sir Alexander John Forsyth Reid, *The Rev. Alexander J. Forsyth and his Invention of the Percussion Lock*, 1909.

Forsyth, Andrew Russell, British mathematician; b. June 18, 1858, at Glasgow; son of John F. Educated: Liverpool College; Trinity College, Cambridge. Sen. wrangler, 1st Smith's Prizeman, 1881. Professor of Mathematics, University College, Liverpool, 1882-3. Lecturer

in mathematics, Trinity College, 1884-95. Sadlerian Professor Pure Mathematics, Cambridge, 1895-1910. Chief Professor Mathematics, Imperial College of Science and Technology, S. Kensington, 1913-23. F.R.S., 1886. Chief work: *Theory of Differential Equations*, 4 pts., 1890-1906.

Fortaleza, also called **Ceara**, the cap. of the state of Ceara in Brazil. It is a seaport, being situated on a bay, though vessels cannot anchor very far into the harbour. The town itself is well arranged, and is connected by rail with the interior regions of the country, which are much more fertile than its environs. It trades principally in coffee, sugar, rubber, and drugs. Pop. of the state was (1926) 1,520,300; of the tn. 78,530.

Fort Beaufort, a dist. in the S.E. of Cape of Good Hope. Its capital is F. B., which lies 45 m. W. by N. of King William's Town. Pop. of dist. 20,000.

Fort Collins, cap. of Lorimer co., Colorado, U.S.A., 74 m. N. of Denver, on the Colorado and S. Railroad. The state agricultural college was opened here in 1879. The city is the centre of a fertile region and has an extensive system of irrigation. Pop. 11,489.

Fort Dodge, the cap. city of Webster co., Iowa, U.S.A., and is situated on the Des Moines R., and on several railroads. Has coalfields, quarries of building stone, and manufs. of pottery, plaster, stucco, and foundry products. Pop. 21,895.

Fort Edward, a vil. in the co. of Washington, New York, U.S.A. It stands on the Hudson R., and on the



ABOVE FORT AUGUSTUS

L. M. S. Rly. Photo.

Fort Atkinson, a city of Wisconsin, U.S.A., lies on the Rock R., 55 m. S.W. of Milwaukee. Situated in an agricultural locality, its industries consist of the manufacture of harrows and dairy machinery, chairs, sleighs and carriages. It has also knitting mills and meat-packing establishments. It received its name from a fortification erected there, in 1836, by General Atkinson during the Black Hawk War. Pop. 5793.

Fort Augustus, a vil. on the Caledonian Canal, at the head of Loch Ness, 33 m. S.W. of Inverness. It was built in 1716, under the name of Kilchumin, and captured by the Jacobites in 1745. After the battle of Culloden it was reoccupied and received its present name in honour of Wm. Augustus, Duke of Cumberland, the victorious general. It was then used as a sanatorium till 1857, and in 1876 was presented to the Eng. order of Benedictines, and converted into a stately abbey, college, and hospice. Pop. about 1000.

Delaware and Hudson Railroad to the N. of Troy. It has iron and brass works, also paper mills and potteries. Pop. 3850.

Fortelracchi, see BRACCIO.

Fortescue, Sir John, the second son of an anct. Devonshire family, b. in Somersetshire and educated at Oxford. He was three times appointed governor of Lincoln's Inn during Henry VI.'s reign, and in 1442 was Chief Justice of the King's Bench, being highly recommended for his wisdom, gravity, and uprightness. He was a great favourite with Henry VI. and held office during the remainder of his reign, faithfully serving and steadily adhering to him. At the accession of Edward IV., F. was charged with high treason, and accompanied Queen Margaret and her court in their exile to Holland. He afterwards returned to England and received a pardon from Edward IV. on the defeat of the Lancastrian party. F.'s fame rests on his work, *De laudibus legum Anglie*, written

during wanderings abroad for the instruction of the young Prince Edward.

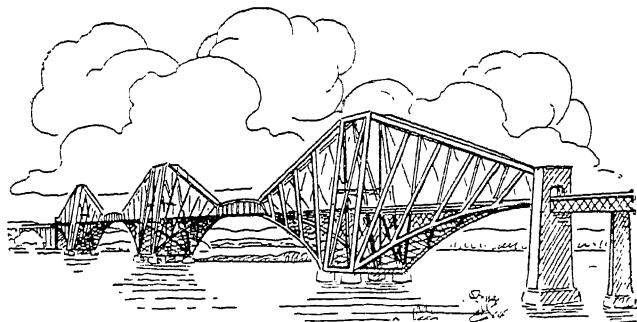
Fortescue, Hon. Sir John William (b. 1859), British military historian, a son of the 3rd Earl Fortescue. Librarian at Windsor Castle, 1905-26. Author of *History of the British Army* (1890-1920), a monumental work in many volumes. Other publications: *History of the 17th Lancers* (1895); *Wellington*, 1925.

Forteviot, a vil. of Scotland, situated in the co. of Perthshire. It stands on the R. Earn to the S.W. of Perth. The old town of that name, which was close by, was the cap. of the Picts and Scots. Pop. 549.

Fort Garry, see WINNIPEG.

Fort George, a fortress in the co. of Inverness-shire, Scotland. It is situated at the mouth of the Moray Firth.

Haddington on the S. The river is navigable for vessels of 100 tons up to Stirling, and for vessels of 300 tons to Alloa. Grangemouth on the F. is connected with Bowling on the Clyde by the F. and Clyde Canal, about 38 m. long, on which Symington tried his first steamer in 1801-2. It is proposed to construct a new canal for large ocean-going vessels. The Firth is a bay-like extension of the river, about 50 m. long, with an average breadth of 2½ m. (as much as 17 m. wide at Prestonpans). At Queensferry it is only 1 m. across, and is spanned by a cantilever railway bridge, 8295 ft. long, with two main spans of 1710 ft. each, built between 1882-90. The Firth is from 3 to 37 fathoms deep, and has good harbours, St. Margaret's Hope being one of the safest Scottish roadsteads.



THE FORTH BRIDGE

Forth, a Scottish river, formed by the union of two headstreams, the Duchray Water and the Avondhu, which drains Lochs Chon and Ard. Rising on the N.E. side of Ben Lomond, the F. flows E., joining the Laggan or Avondhu (Perthshire) just above Aberfoyle. The 12½ m. between Stirling and Alloa are known as the 'Links of F.', from the innumerable picturesque windings. The river then expands into the arm of the N. Sea called the Firth of F. (Bodotria, Boderia, Æstuarium, Scots Water). The river is about 107 m. long, reaching Stirling after a picturesque course of 39 m., instead of a direct one of 18 m. Its chief tributaries are the Toith, draining Lochs Katrine, Achray, Vennachar, and Lubnaig (by means of the Leny), the Allan Water, and the Devon. It divides the shires of Perth, Clackmannan, and Fife on the N. from Stirling, Linlithgow, Edinburgh, and

Rosyth, near by, has been a great naval base since 1903. The Bass Rock and the Isle of May are at the entrance to the Firth, which encloses the islands of Inchcolm (with a ruined monastery), Cramond, and Inchkeith (with a lighthouse, as has also the Isle of May). The chief rivers flowing into the Firth are the Carron, Avon, Almond, Water of Leith, Esk, and Leven. Its chief port is Leith, the port of Edinburgh. Others are Granton, Bo'ness, Grangemouth, and Kirkcaldy. Salmon and herring-fisheries are carried on in the F.'s basin, and white fish abound. There are various places of historical interest on the river's banks, amongst them Stirling (once a royal residence), Cambuskenneth, Alloa, Kincardine, and Aberfoyle. Falkirk, near by, has the remains of the wall of Antoninus, and Carberry Hill and Loch Leven are not far distant. Bede (d. 735) called the Firth *Sinus orientalis*; to

Nennius (*fl.* 796) it was the *Mare Friescum*. Consult Dick, *The Pageant of the Forth*, 1910.

Fort Hamilton, a vil. of Kings co., New York, situated on Long Island. The fort serves as a defence of New York.

Forth and Clyde Canal. A canal 40 m. in length by means of which the R. Forth communicates with the Clyde. It extends from Grangemouth on the E., to Bowling, Dumbartonshire, on the W., and divides the country at its narrowest part. It was completed in 1791. It is not used regularly by any great volume of traffic.

Fortification, 'the art or science of fortifying places in order to defend them against an enemy.' F. may definitely be divided into three parts: First, permanent Fs., which are being continually built in time of peace to defend some vulnerable point in the defences of a country. Much time and labour are given to this, as, especially on the Continent, the permanent Fs. form a very essential part of the country's defences. Secondly, semi-permanent Fs., such, for example, as are erected when war seems to be imminent and care is being taken to see that all points of the defence are made secure. Thirdly, field Fs., e.g. such military works as are constructed by military engineers during a campaign which have no real permanence and which are only of value during the campaign itself. Such works are built to strengthen the position taken up by an army and to provide as many obstacles as possible to the attacks of the enemy. Field Fs. reached an extraordinary pitch of development in the Great War (*see, e.g., HINDENBURG LINE; HOHENZOLLERN REDOUBT*).

During the early stages of the world's history defence was stronger than attack. The main weapons of attack were the battering-ram and the catapult. This latter weapon usually hurled huge stones at the walls of the place attacked. Obviously then the best means of defence against attacks of this kind was the building of huge walls. These, which often attained a thickness of 30 to 40 ft., were practically impregnable, and to this fact the baron owed a great deal of his baronial power. It was obviously impossible for the king to take the castles save by a long siege, and the time expended on such a proceeding was not sufficiently compensated for by the result. The great curtain wall of the castles was commanded by huge towers at each corner, which prevented the enemy from easily attacking the walls, since they could be met by a front and flank defence. Up to

the time of the Renaissance the castle may be regarded as the chief method of F. The invention of gunpowder did not immediately bring with it the abolition of the castle. At first the difficulties of firing and the bad ammunition used (usually stone balls) caused little or no damage to the fortified places, but with the invention and customary use of cast-iron cannon balls, the superiority of the fortified places over the army of attack came to an end. The classic example is the rapid success of Charles VIII. of France during his attack upon the fortified places of Italy. Before his artillery these places fell rapidly, and new means had to be adopted to prevent the enormous damage done by the artillery fire. Mounds of earth began to replace the lowering walls of the forts, and these mounds were protected by means of wide deep ditches. The depth was usually 20 to 30 ft., and the ditches were strengthened with masonry (*revêtements*). The trace of the castle also began to alter, and the sixteenth century saw the erection of great bastioned fortresses. The enemy naturally massed their artillery together when besieging a fortress in order the more easily to breach the curtain wall.

The bastion (*see BASTION*) consisted of two faces and two flanks, and a cross fire was able to be poured on to the massed artillery of the enemy from the face of the bastion, whilst at the same time from the flank of the bastion the curtain wall could be easily defended. The enemy could also be attacked by a direct fire from the curtain wall. The attacking army gradually altered its tactics. Instead of attempting to breach the curtain wall, it began to attack the bastion itself. The usual point of attack was the salient angle of the bastion—that is, the angle formed by the meeting of the two faces of the bastion itself. Ravolins or outworks which commanded the position of the attacking artillery were consequently added in order to counter this form of attack, and under the great engineers of the sixteenth and seventeenth centuries, the outworks of the bastions were extended until they became what can best be described as a step-by-step defence, i.e. the garrison resisted to the best of their ability until forced to retire from the outer line, when they fell back on the next line, resisting all the time. The names of famous engineers during this period are legion, but probably the greatest of all names is that of the Fr. engineer, Sébastien le Prestre de Vauban. This great engineer took part in numerous sieges between the years 1667–98, and was

eminently successful in his work. He was essentially practical, and although he himself did not believe in systems of F., still it is chiefly by his first, second and third systems that he is known to posterity. The art of war underwent some considerable modification during the seventeenth and eighteenth centuries, but in no essential feature did it actually change. The sieges of the Napoleonic wars were conducted on almost similar lines to those of Marlborough's campaigns, but with the end of these wars a change was brought about. The range of the artillery was rapidly increasing; the distance from which they were effective had increased to half a mile. It became obvious, therefore, after the Napoleonic wars that the guns of the besiegers must be kept at a greater distance. The enceinte, *i.e.* the line of Fs. forming the chief works of a fortified place, must be more amply defended. To do this fortresses were built some distance from the enceinte and yet sufficiently close to one another to be able to give support when attacked. Each of these smaller fortresses was self-sufficient, *i.e.* it was adequately garrisoned and adequately provisioned so that if necessary it could stand a siege by itself. These fortresses were built on much the same plan as was used for the larger fortresses themselves. The introduction of rifled artillery fire caused stonework Fs. which were exposed to artillery to be condemned. The Franco-Prussian War and the Siege of Paris proved the uselessness of the fortress defended by bastions. Fortresses were thrown out to prevent the direct attack of the enemy on the enceinte to greater and greater distances. This in itself made it necessary that the besieging army should increase in proportion to the distance to which the protecting fortresses were thrown out, since the zone to be invested by the besieging army had become much greater. The main lines which modern Fs. follow (subject to the lessons taught by the Great War, as to which *see infra*), however, are: That in the first place the girdle of fortresses should be thrown out to such a distance that direct bombardment of the place cannot take place. Secondly, that the guns in the fortresses should be protected by armour, but that the bulk of the defending artillery should be outside the defended fortress. Thirdly, that the defence should depend to a very large extent upon the infantry, and that for this purpose the forts should be connected one to another by means of infantry entrenchments. Fourthly, that the lines of communication

should be kept open and well guarded between the main fortress and the girdle of defensive fortresses. The guns outside the fortresses are either to be concealed or protected by means of cupolas, and the entrenchments of the infantry should be made bomb-proof. The great art in defence as well as attack in modern times is concealment, and this has recently been made much more possible by means of the invention of smokeless powder. Modern F. is rapidly approximating to field F., since, as stated above, the main line of defence is the infantry strongly entrenched in redoubts prepared and made bomb-proof. The strength of a fortified position depends upon its communications, the rapidity with which the defending infantry can co-operate, and the concealment of its guns.

Field Fortification.—The differences between permanent, semi-permanent, and field Fs. were a century ago very much more strongly marked than they are at the present time. Nowadays no masonry defences are necessary to make a place defensible, and in a short time, with surprisingly little material, very strong Fs. can be made. The elementary field Fs., such as the use of obstacles for defence, have been known practically since the dawn of history. Trenches, abatis, and stakes have always formed a part of the protective measures of even savage tribes. But the art of field F. has undergone tremendous changes during the last century. Practically up to the present time the great object aimed at by field engineers was to obtain command and to defend by obstacle, nowadays military engineers aim at obtaining concealment and protection. The main points to be noticed in modern field Fs. are: That the works erected are adapted to the ground which is being defended. The line of the trenches usually follows the natural line of the hill and valley on which they are erected. Secondly, the erection of elaborate bomb-proof shelters and parapets has been made practically unnecessary, since no military work can be thrown up in a short time which is able to resist the highly explosive shell which is fired nowadays. Thirdly, the most important point of all is to obtain a concealed position. This is an additional reason why parapets are made nowadays comparatively low, seldom, if ever, exceeding 18 in. in height. Fourthly, although obstacles are still used and created, *i.e.* wire entanglements, pits, and abatis, these are gradually falling more and more out of use, but they are still of considerable value when stopping the rush of the enemy, and give the defender an

opportunity of attacking the enemy while he is labouring under difficulties. Another object of field F. is to give the enemy as little shelter as possible. With this object the ground in front of the position to be defended is cleared as far as possible to the limits of the range of fire. The outstanding military lesson from the Great War is that it is practically useless to depend on permanent works of defence constructed some years before a campaign, because the continued progress of scientific and industrial development in relation to offensive weapons more than counterbalances the military value of such works. Liège, with its twelve forts in a perimeter of over 30 m., fell within nine days under the pounding of Ger. howitzers of 21 cm., 28 cm. and 42 cm. As the ground between the forts had not been provided with field defences or obstacles, the Ger. infantry were in the city before the forts had fallen. Namur fell in a similar manner, the forts being literally blown to pieces. The German bombardment opened Aug. 20, 1914, and all forts were destroyed by the 25th. The defence of Antwerp was carried out on different lines from that of Liège and Namur. Although the Ger. soon demolished the forts, they had also to contend with a defensive trench line held jointly by some Belgian forces and the British Naval Division along the rivers Nethe and Rupel. Several attacks were made on the Nethe line, but were all repulsed, until the Ger. secured a crossing on Oct. 6. Although the steel and concrete forts and works fell in four days, the trench line held out for six. Mauberge was similar to Antwerp. Here the commander constructed field works well in advance of the permanent works, and although the forts were swiftly destroyed, the field works held the Ger. in check for over a week, a delay which had an important bearing on succeeding events, because it held up 60,000 Ger. troops and deprived von Kluck of facilities for supplying his command in its advance to the Marne. Verdun was mainly a repetition of Mauberge as regards methods of defence. Confidence was not placed in the great forts, but during the winter of 1914-15 a new defence line was constructed some miles beyond the outer line. This line was eventually forced back to within 4 m. of Verdun, but it covered the most important points. See also VERDUN.

Some of the new features that have affected fortifications are *Aircraft*, which can locate works hidden by rising ground and can bomb at practically any distance in the theatre

of operations; *Artillery*—long-range heavy guns can be made mobile by mounting on railways; *Camouflage* (q.v.) can be used by both sides, i.e. to hide works and also to screen guns.

Concrete 'pill-boxes' were an undoubted success in the Great War. They could resist a direct hit by a 6-in. shell and were usually too small and well concealed to be hit by large shells. The use of gas by an attacker can render areas in F.s. virtually ineffective for several days, according to the type and quantity of gas used.

Although peace-time construction of works is not now advocated, certain preparatory measures may be undertaken in order to reduce the work to be done on the outbreak of war, e.g. arrangements for the clearance of the field of fire and view, provision of communications, siting of storage depôts, tracing of trenches, works and other essential features. It is to be noted, however, that the Belgian government has recently (1931) made large appropriations to the improvement of their frontier fortifications. See *Textbook of Fortification*, 1893; Clarke, *Fortification*, 1907; Plessis and Legrand, *Manuel complet de Fortification*.

Fortiguerra, Niccolo (1674-1735), an Italian poet and bishop, b. at Pistoia. His best remembered work is *Il Ricciardetto*, 1738, a satirical epic. See Francesco Carniel, *Notizie della vita e della opere di Niccolo Fortiguerra*, 1895.

Fortitude Valley, a suburb of Brisbane in Queensland, Australia. Pop. about 16,000.

Fort Johnston, a station of British Central Africa. It is situated in Nyasaland at the spot where the R. Shire flows from Lake Nyasa.

Fort Lee, a borough of New Jersey, U.S.A., lies on the W. bank of the river Hudson, opposite the N. part of New York, of which city it is a residential suburb. It received its name in honour of General Charles Lee, being originally a fortification erected by the Americans early in the War of Independence. Held in 1776 by General Greene, it was abandoned by him on the advance of Lord Cornwallis, and an attempt to recover it in 1780 failed. Pop. 8759.

Fort Madison, the cap. city of Lee co., Iowa, U.S.A. It is situated on the Mississippi R. and on several railroads, including the Atchison, Topeka and Santa Fé Railway. The state penitentiary is in this town. It has also iron foundries, paper mills, and machine shops and manufs. of farm implements. Pop. 13,779.

Fortnightly Review, *The*, an English periodical for the expression of political and social views of the philo-

sophical Radicals, established in 1865 by George Henry Lewes. Two years later John Morley succeeded to the editorship, and till 1882 he continued to direct the periodical. He, in turn, was succeeded by T. H. S. Escott, Frank Harris, and William L. Courtney (*q.v.*), who took over the *Fortnightly* in 1893 and retained the editorship till his death. The offices of the paper are at 11 Henrietta Street, London.

Fort, Paul (b. 1872). Fr. poet, b. at Rheims. In 1890, founded his Théâtre d'Art for the production of poetic and romantic plays. His own poetry is often symbolist, with marked assonances or even regular Fr. alexandrines. It shows a deep love of old historic France. Has pub. many volumes of 'French ballads,' some of his most successful subjects being Louis XI, Joan of Arc and Charlemagne, and themes on the île de France and Touraine.

Fortrose, a bor. of Scotland, situated on Moray Firth, in co. Ross, 10 m. N.E. of Inverness. It consists of two towns, Rosemarkie and Chanonry. There is a good harbour, and it is a summer resort for golf and bathing; there are interesting ruins of a red sandstone cathedral (1460). Pop. 970.

Fort St. George, see MADRAS.

Fort Scott, a city of Kansas, U.S.A., and cap. of Bourbon co. It has two foundries and flour mills, and manufs. of machinery. Pop. 10,763.

Fort Smith, a city of Arkansas, United States, and cap. of Sebastian co.; it is situated on the Arkansas R., 140 m. N.W. by W. of Little Rock, and is served by four lines of railway. It has a good position as a trade centre: the manufs. are chiefly oil, furniture, etc. Pop. 31,429.

Fort Sumter, a fort in Charleston harbour, S. Carolina, United States, about 4 m. from Charleston. Here the first Civil War engagement took place in 1861. The Federals under Major Anderson surrendered to the Confederates. In 1865, at the fall of Charleston, the fort was captured and destroyed by the Federal fleet.

Fortuna or **Fortune**, the goddess of chance in classical mythology: an Italian goddess of great antiquity, extensively worshipped from an early period under a variety of different names. The Greeks called her Tyche, and she was represented on coins as either the giver of prosperity, the controller of destinies, or as indicating the uncertainty of the future. She worked with no reference to law, entirely at her own good pleasure, dispensing joy or sorrow indifferently, unlike the goddess of Destiny or Fate. F. had temples at Smyrna, Corinth, Elis, Antium, and Præneste, and in

the last one, two statues of her were consulted as oracles. She is generally represented by Greek sculptors with a rudder, cornucopia, ball, wheel or wings, as her distinctive symbols. See Roscher's *Mythological Lexicon*, and Wissowa, *Religion und Kultus der Römer*.



FORTUNA

In this representation of the goddess she is seen with her principal attributes, the cornucopia and the rudder. She is also given attributes of other deities, and such 'composite' statues were called *Signa Panthea*.

Fortunate Isles, another name for Canary Islands (*q.v.*).

Fortunatus, a popular collection of tales, centring round the adventures of Fortunatus and his son, with their inexhaustible purse and wishing-cap, the moral being that worldly prosperity alone is insufficient to produce lasting happiness. The book originated about the end of the fifteenth century, though some of the legends included are of older date still. The oldest printed edition now extant bears the date 1509. Versions of the story have appeared in German, French, Italian, Dutch, English, Danish, Swedish, and Icelandic. The story was dramatised by Hans Sachs in 1553, and by Thomas Dekker in 1600. An unfinished narrative poem of the tale, entitled *Fortunatus and his Sons*, was left by Ludwig Uhland. See Dr. F. W. V. Schmidt's *Fortunatus und seine Söhne*, etc., and J. J.

Göres, *Die Deutschen Volksbücher*, 1807.

Fortune-telling. Under the Vagrancy Act of 1824 in England any one pretending to tell fortunes is liable to imprisonment as a disorderly person, but prior to this date, the telling of fortunes by palmistry, astrology, or other forms of divination was not an offence against the law. The art of palmistry, viz. revealing and foretelling events, past and future, by examination of the palm of the hand, is of great antiquity, and there is much reference to the subject in different writers. See DIVINATION and PALMISTRY.

Fortuny Carbo, Mariano Jose Bernardo (1839-74), a Spanish painter and etcher, b. at Reus in Catalonia. He studied in the Academy of Barcelona, and in 1856 won a prize which enabled him to study at Rome. During the Spanish war against Morocco, F. followed the army to Africa and filled his portfolios with studies from Eastern life, portraying their domestic and ceremonial aspects. He had an exceedingly dexterous touch, and treated his subjects simply as colour schemes for gorgeous draperies and vivid sunlight. In 1865 he went to Madrid to copy the Spanish masters, where he fell under the influence of Goya. He visited Paris in 1866, and soon after settled in Rome, where he devoted himself to kaleidoscopic pictures of the rococo period, his studio in Rome becoming a salon for many brilliant members of the social world, as well as artists and men of letters. In 1871 he went to Granada, where he stayed for two years, but returned to Rome in 1874 when he died. F.'s work is the dominating influence of the Spanish art of to-day, and has also influenced the French school. It is distinguished by a superlative facility of execution, and a marvellous cleverness in the arrangement of colours. He had a great love of detail, and chose subjects that allowed of his displaying his readiness as a craftsman. Some of his most noted pictures are: 'The Spanish Marriage,' 'The Poet,' 'The Rehearsal,' 'The China Vase,' 'The Trial of the Model,' 'An Ecclesiastic,' 'Don Quixote,' 'The Snake Charmers,' 'Moors Playing with a Vulture,' 'Hindoo Snake Charmers,' 'The Butterfly,' 'Camels at Rest,' etc. A large number of his works are in America, both in public and private possessions. See Davillier, *Fortuny, sa vie, son œuvre, sa correspondance*, etc., 1876; C. Vriarte, *Fortuny*, 1889 (Artistes Célèbres series).

Fort Wayne, Indiana, U.S.A., cap. of Allen co., 148 m. from Chicago. It is an important railway centre, and

manufs. organs, woollens and engines. It is the seat of a Catholic bishop and has a convent, academics, and colleges. Pop. 114,496.

Fort William, Calcutta, the name given to three villages conferred upon the E. India Company in 1700 by the Emperor Aurunzebe. They were immediately fortified, and received their name in honour of William III.

Fort William, Canada, a port of Ontario, situated on Lake Superior, 420 m. from Winnipeg. It carries on a large grain trade, and is the connection between the eastern and western sections of the Canadian Pacific Railway. Pop. 8000.

Fort William, Inverness, Scotland, near the head of Loch Linne, at the S. end of the Caledonian Canal. The fort was built in 1665 by Monk; rebuilt in 1690; besieged by the Jacobites in 1746, and demolished in 1890 to make room for a railway station. For many years F. W. was the key of the Highlands, and is now a well-known centre for tourists. Pop. 3487.

Fort Worth, a city of Texas, U.S.A., cap. of Tarrant co., on Trinity R., 30 m. from Dallas. It is on the Missouri, Kansas and Texas, Texas and Pacific, and other railways. There are flour and grist mills, machine shops, foundries, and tanneries. Manufs. include flour, woollen and cotton goods, cotton-seed oil, agricultural implements. F. W. is the seat of a polytechnic college, it has a stockyard, a university (1881), and a medical college. There are also a court-house, a city hall, and two opera houses. Pop. 163,447.

Forty, a cardinal number equivalent to four tens, denoted by the symbols 40 or XL. From time immemorial this number has apparently been regarded with superstitious veneration by both Jews and Moslems, and figures largely in the Bible and in Mohammedan writings. See notes to W. A. Clouston's *Group of Eastern Romances and Stories* (privately printed, 1889) for Biblical references. Moslems mourn F. days for their dead, and consider women ceremoniously unclean until F. days after childbirth. Similarly, the number F. appears repeatedly in Moslem fictions, as in the Arabian *Tale of the Third Calender*, or *Aladdin and his Wonderful Lamp*, or the Persian Romance of *Nasir*. Gangs of robbers in Eastern tales usually number F. (cf. *Ali Baba and the Forty Thieves*). In Wales F. loaves of bread and F. dishes of butter commonly occur in records of rent paid to the Bishop of Llandaff. A bard's fee for his song was 40d. if a disciple, twice 40d. if a master. Ships suspected of being infected with cholera or any infectious disease

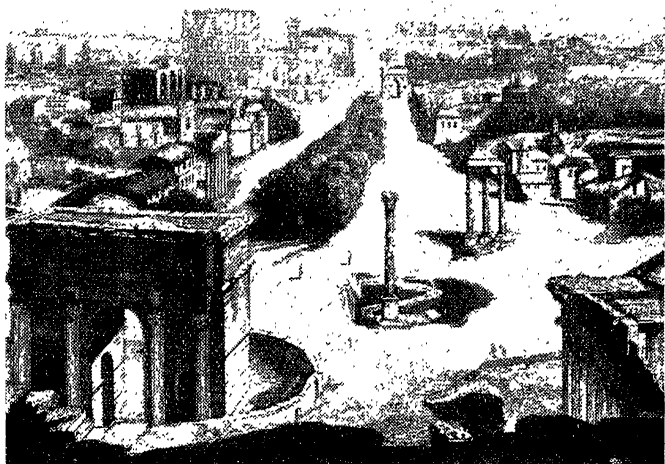
are placed under 'quarantine,' forbidden to land passengers or cargo, for F. days. The privilege of sanctuary lasted F. days. There is a popular superstition that St. Swithin's Day is followed by F. days of either rain or sunshine.

'Forty-five' ('45), The, a term employed by modern writers for the year 1745 and the Jacobite Rebellion under Prince Charles Edward, 'the Young Pretender,' or 'Bonnie Prince Charlie,' which was crushed at Culloden Muir, 1746. See Hume Brown, *Hist. of Scotland*, iii., 1909;

Topographie der Stadt Rom im Alterthum, 1871; Marucchi, *Le Forum Romain*, 1901; Chambers, *New International Encyclop.*; Smith, *Dict. of Classical Antiq.*

Forum Appii (mod. Foro Appio), a small tn. of ancient Latium, Italy, on the Appian Way among the Pontine Marshes, 43 Roman miles from Rome. A canal started from here, running S. nearly to Terracina. See *Hor. Sat.* i. 2; *Acts xxviii.* 15.

Foscari, Francesco (b. c. 1372), a doge of Venice (1423-57). In early life he was guardian of the young



THE FORUM ROMANUM
(Engraving dated 1864)

In the foreground can be seen the Arch Septimius Severus, the Temple of Fortune, the Column of Phocas, and three columns of the Temple of Jupiter Stator. At the end of the Via Sacra can be seen the Arch of Titus, and to the left, the Coliseum.

Scott, *Waverley*: Amédée Pichot, *Hist. de Charles Edouard*, 1830.

Forty Shilling Freeholder, see ELECTORATE.

Forum, in Roman times the central public space of a city, especially the market-place of Rome itself, the 'forum magnum,' extending from the foot of the Capitoline to N.E. of the Palatine. It was used as a place of assembly for political, judicial, and other public business. Discussions were held there, and speeches made from the 'rostra.' By degrees the original single forum developed into numerous different fora, each for some special purpose. See Jordan,

Marquis of Mantua, and won fame as one of the procurators of San Marco. As doge he waged numerous wars against Filippo Maria Visconti, Duke of Milan, and other Italian princes, securing Carmagnola as general of his allied forces. After the first war (1426-7) Venice won the provinces of Cremona, Bergamo, and Brescia. The second war (1431-3), after a hard struggle, fixed the Adda as the Venetian boundary. A third war, against Bologna, Milan, and Mantua, broke out about 1435. Supported by Cosmo de' Medici and Francisco Sforza, Venice finally conquered Velaggio, Peschiera, and

Lonato. The peace of Lodi (1454) put an end to hostilities. F.'s later life was clouded by the cruel machinations of his rival, Giacompo Loredano, especially directed against F.'s son, Giacompo. The latter was condemned and tortured, probably unjustly, by the Council of Ten, 1444-57. The doge was deposed in 1457, and *d.* a few days later. See Byron's tragedy, *The Two Foscari*, 1821; Rogers, *Italy*, 1822; Verdi's opera, *I Due Foscari*, 1844; Brown, *Venice*, 1893.

Foscolo, (Niccolò) Ugo (1778-1827). It. poet and patriot, went to Venice from Zante about 1793. From 1796 onward he was an officer in the armies of various attempted Italian republics, and served in France (1804-6). In 1808 he was appointed to the chair of eloquence (shortly afterwards abolished in all Italian universities) at Pavia University, delivering the discourse 'Dell' origine e dell' ufficio delle letterature.' His tragedy *Ajace* (performed 1811, first published 1828), supposed to contain hits at Napoleon whom he no longer admired, caused him to leave Milan till 1813 and the decline of Napoleon's power. When the Austrians regained control of the town, F.'s patriotic sentiments forced upon him a voluntary exile in Switzerland and England (c. 1816). His remains were removed from Chiswick to Florence, 1871. His works include: *Luigia Pallavicini caduta da cavallo*, and *All' amica risanata* (2 odes), 1799-1803; *Ultime lettere di Jacopo Ortis*, 1797 (novel influenced by Goethe's *Werther*); *I Sepolcri*, 1807; *Sul testo della Commedia di Dante* (1842 edition of Dante's poem); translations of Homer, and Sterne's *Sentimental Journey*. See *Collected Works*, by Le Monnier, 1850-62; Tobler, 1871. Consult Gemelli, *Della vita e della opere di U. Foscolo* (2nd ed.), 1881; Winckels, *Vita*, 1885-92; also *Lives* by Artusi, 1878, Traversi, 1884, Pallaveri, 1892; Chiarini, *Gli amori di U. Foscolo*, 1892, and *Poesie di U. Foscolo*, 1882; Ferrari, *Poesie di U. Foscolo*, 1891; *Foreign Quarterly Review*, May 1832; Longfellow, *Poets and Poetry of Europe*.

Fosdick, Harry Emerson, American clergyman; b. May 24, 1878, at Buffalo, N.Y. Graduated Colgate University 1900; and Union Theological Seminary, 1904. Ordained Baptist minister, 1903. Pastor, first church Montclair, N.J., 1904-15. Instructor in homiletics, Union Theological Seminary, 1908; professor practical theology, 1915. Special preacher, first Presbyterian Church, New York, 1918; indifference to credal requirements caused his retirement, 1925; since when he has

become pastor of Park Avenue Baptist Church, which has forgone baptismal requirements.

Foss, Foss-way, or Fosseway, one of the great ancient military roads constructed by the Romans in England and other parts of Europe, so called from the fosse on either side to keep it well drained and dry. This road or series of roads ran from Lincoln, via Leicester (Rate) and Bath, to Exeter. It went past Newark and High Cross (Venonae), intersecting Watling Street at a point called the 'centre of England,' then on past Cirencester, the hills near Chard, Axminster, Honiton, and Silchester. It is mentioned by eleventh century writers as one of four 'royal roads' in Britain. See Guest, 'The Four Roman Ways' in *Origines Celticae*, 1883. See also WATLING STREET.

Foss, or Fosse (Lat. *fossa*, a ditch, and *fodio*, I dig), in fortification, a long narrow excavation, such as a moat or ditch, dug outside the walls or rampart of a fort to serve as barrier against the advancing foe and prevent an escalade. It is often filled with water or with abatis, and palisades.

Fossa, or Foussa (Malagasy), the largest carnivorous mammal of Madagascar. A cross between cats and civets, it is about twice the size of a house-cat (about 5 ft. long), with a long, tapering tail, and sharp, curved, retractile claws. The naked soles of the hind-feet rest entirely upon the ground in walking. The colour is usually a uniform, unspotted, pale brown, and the hair short and close. These animals are of a very savage disposition, and of nocturnal habits. They feed on small animals and birds, sometimes invading poultry-yards. They are usually regarded as representing a group (Cryptoproctine within the civet family (Viverridae), under the name *Cryptoproctus ferax*.

Fossa et Furca, see PIT and GALLOWS.

Fossano (Fons Sanus, or Fossanum), a tn. and episcopal see of Piedmont, Italy, Cuneo prov., 14 m. from Saluzzo, on R. Stura. It has old walls, a cathedral with good paintings, palaces, theatre, a scientific academy, and a fourteenth-century castle. There are mineral baths, and manufactures of paper, leather and silk. Pop. about 18,100.

Fossil Copal, a hard resin found in the earth as the product of trees long since dead. Copal is a name given generically to almost any resin that is capable of being used in the preparation of varnish. The variety known as F. C. is found in the regions around Zanzibar, where it is dug up in the form of pebbles or nuggets.

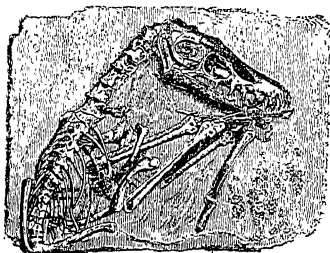
Fossils. The term F. (Lat. *fossus*, dug up) was formerly applied to any object taken out of the earth's crust, whether mineral or organic. Its meaning has now been restricted so as to include only the remains or traces of animals and plants which have been buried in the earth by natural causes. We therefore include under the term not only remains of organisms but objects which point to the previous existence of organisms. Thus the footprints of animals and the burrows and trails



BIRD TRACKS FOUND IN CONNECTICUT
(Rock Salt)

of worms in shales and sandstone are as much F. as are the remains of the organisms themselves. The majority of F. are the actual parts of animal or plant organisms, such as the shells of molluscs, the calcareous skeletons of corals, the teeth and bones of vertebrate animals, and the trunks, branches, and leaves of plants, the state of preservation being dependent on the amount of change undergone subsequent to their burial. For preservation in the F. state, it is self-evident that the organism must be covered up by sediment, or it will disappear by the processes of decay. The remains, then, of terrestrial animals and plants are less likely to become preserved than marine organisms, and the conditions must necessarily be local. Hence, land plants and animals may be found in lakes, peat bogs, and marshes, in deltas, mineral springs, etc. Thus we have the Irish elk preserved in the peat bogs of Ireland, land animals and herbage which have been swept by rivers into lakes and deltas and there deposited, together with fauna and flora of distinctive lacustrine type, and we have also higher forms of terrestrial life preserved in 'bone caves.' It is in the sea that the most favourable conditions for the preservation of organic forms prevail. In the marginal waters of the ocean sheets of mud and sand are laid down and cover the remains of the fauna which flourish there. Masses of organic limestone are formed in the deeper waters, and, finally, in the deepest parts of the ocean we have only the remains of the harder parts of organisms, such as teeth and ear bones covered up in the abysmal

sediments. The condition of the preserved remains depends upon the structure and composition of the organisms, and also on the manner of fossilisation. The skeletons of most vertebrates consist of calcium phosphate. In the invertebrates the durable parts may be carbonate of calcium (calcite or aragonite) as in the mollusca, or may be composed of silica as in the diatoms. The relics of insects preserved to us we owe to the durability of their chitinous integuments, while coal is the result of the preservation of the durable cellulose of the plants. As regards the condition of preservation, we may distinguish the following types: (1) *The original substance is preserved unaltered.* In the case of the Siberian mammoth, the whole carcass is retained, while entire insects have been preserved in amber. All bodies originally stony, such as shells, corals, and, in a lesser degree, trees and their fructifications, are sometimes wholly preserved. Naturally, we find F. least changed from their original condition in the newest rock formations and most changed in the oldest, but all fossiliferous strata contain some F. which are practically unaltered. (2) *The original substance is replaced by mineral matter with partial or entire preservation of the structure of the organism.* This is also known as petrification, the



FOSSIL OF PTERODACTYLUS CRASSIROSTRIS (JURA)

organic matter being replaced, molecule by molecule, by mineral matter, such as calcite or silica. The most minute structure has thus been preserved, as in the case of silicified wood, where the organisation of the plant may be seen under the microscope as distinctly as in the section of a modern tree. The aragonite shells of invertebrates, such as Gasteropods and Lamellibranchs, are dissolved away, and entirely replaced by more durable calcite, forming 'pseudo-

morphs after aragonite.' (3) *The original substance is wholly removed, the external form being retained.* After mineral matter has gathered round the organism and hardened there, the organism itself decays. There is left, then, merely a hollow mould retaining the external form of the organism. These 'hollow casts' may be filled later by mineral matter, which may have been mechanically deposited or chemically precipitated from infiltrating waters, forming what are called 'solid casts.' These casts show none of the internal structure of the organism but only the external form. F., as well as being of interest as records of the progress of organised life on the globe and lending such strong support to the doctrine of evolution, are of use to the geologist in throwing light on the former conditions of physical geography. The distribution of sea and land, the various changes of climate, and the distribution of plants and animals in past times are indicated. Further, they are of great importance in geological chronology. Having the order of superposition of the strata determined, it has been possible by the use of the contained F. to correlate the sequence of stratified formations in different parts of the world, still further to fix stratigraphical horizons and subdivide any one formation into a series of life zones. See Seward's *Fossil Plants*, 1892; Nicholson's *Manual of Palaeontology, Monographs of the Palaeontological Society*; Hutchinson's *Extinct Monsters*, 1892; Darwin's *Origin of Species*. See also GEOLOGY and PALAEONTOLOGY.

Fossombrone (Forum Sempronii), a tn. and episcopal see of The Marches, Italy, prov. of Pesaro and Urbino, 16 m. from Fano, on R. Metauro. It has a cathedral, silk manufs., and mineral springs. Pop. (com.) c. 11,000.

Fossombroni, Vittorio (1754-1844), an It. statesman and scientific writer, studied at Pisa University, excelling in mathematics and philosophy. He became Minister of Foreign Affairs to the Grand Duke of Tuscany (1796), and held offices under the new gov. of Bonaparte (1799). Refusing to act as Councillor of State on the formation of the kingdom of Etruria (1801), he consented to act as Commissioner of Finance. On the restoration of the Grand Duchy (1814), F. became Prime Minister, under Ferdinand III. and Leopold II. He succeeded in putting Tuscan finances on a sound footing. He wrote treatises on hydraulics, mathematics, etc., including *Sur l'intensité de la lumière*, 1782; *Mémoire historique sopra le val di chiana*, 1789;

Sur le principe de la vélocité virtuelle, 1796; *Sur l'amélioration des marais Pontins*, 1805. See Capponi, *Il Conte V. Fossombroni*.

Foster, Rt. Hon. Sir George Eulas, Canadian statesman; b. Sept. 3, 1847, in co. Carleton, N.B. Educated N.B. University, Edinburgh, Heidelberg. Taught school. Professor of classics, N.B. University, 1872-9. General manager Union Trust Co. till 1909. Conservative M.P. 1882-1900; also 1904. Senator, 1917. Minister of marine and fisheries, 1885-9; of finance, 1889-96. Leader of Commons 1895-6. Minister of trade and commerce, 1911-21. K.C.M.G., 1914; P.C., 1916; G.C.M.G., 1918. Headed Canadian delegate to League of Nations Assembly, 1920 and 1926.

Foster, Sir Michael (1836-1907), an Eng. physiologist, graduated at London University in medicine, 1859. He practised for a time at his native Huntingdon, then returned to London, becoming Professor of Practical Physiology at University College, 1869, and at Trinity College, Cambridge, 1870-83. He was secretary of the Royal Society, 1881-1903; and Professor of Physiology at Cambridge University, 1883-1903. In 1900 he was Liberal representative of London University in Parliament, but defeated in 1906. Created K.C.B. in 1899, he was president of the British Association at Dover in that year. F. was chairman of the Royal Commission on Tuberculosis, and member of that on Sewage Disposal. He greatly influenced the study of biology in Great Britain. His works include, *Primer of Physiology*, 1874; *Studies from the Physiological Laboratory in Cambridge University*, 1876-7; *Textbook of Physiology*, 1876; *The Elements of Embryology* (with Balfour), 1874; *Course of Elementary Practical Physiology* (with Langley), 1876; *Lectures on the Hist. of Physiology in sixteenth, seventeenth, and eighteenth centuries*, 1901. He was joint-editor of *Scientific Memoirs of Th. H. Huxley*. See *Dict. Nat. Biog.* (2nd supplement, vol. II.).

Foster, (Myles) Birket (1825-99), an Eng. painter and engraver, early apprenticed to the wood-engraver Landells. He engraved plates for Gray's *Elegy*, Coleridge's *Ancient Mariner*, Longfellow's *Evangeline* (1850), *Old English Ballads*, and the works of Milton, Goldsmith, and others. From 1859 F. began painting in water-colours. His landscapes and scenes of rural and child-life were his best works. Some of the best known are 'Nutting,' 'The Bird's Nest,' 'Sailing the Boat,' 'Cows in the Pool,' 'Feeding the Ducks,'

'Arundel Mill,' 'Castle of Rheinfels.' His illustrated *Christmas with the Poets* appeared in 1850; *Couper's Task*, 1855; *Brittany*, 1878; and *Some Places of Note in England*. See Scherer, *The Birket Foster Album*, 1880; Cundall, *B. Foster*, 1906.

Foster, Stephen Collins (1826-64), an American song composer, b. near Pittsburg, Pa. He is especially noted for his negro melodies, which have become very popular in all English-speaking countries, notably: 'The Old Folks at Home,' 'Massa's in the Cold, Cold Ground,' 'Lousiana Belle,' 'Come where my Love lies Dreaming,' 'Nellie Bly,' etc.

Fostoria, a tn. of Ohio, United States, in Seneca co., S. of Toledo and 21 m. S.W. of Fremont. It is intersected by five lines of railway, and is therefore an important railway centre. There are flour-mills and glass-works. Pop. 9597.

Fothergill, John (1712-80), an Eng. physician of Yorkshire. He was a Quaker, and noted for philanthropy and professional skill. He helped to found a school for Quaker children at Ackworth, and assisted Howard in his efforts to reform prison management. He wrote papers for *Philosophical Transactions*, and for *Medical Observations and Enquiries by a Society of Physicians in London* (1773-5). His *Account of the Sore Throat* (1748) won him fame. See *Works* (Lettsom's ed.), 1783-84; Lettsom's *Memoirs* (4th ed.), 1786; *Memoirs of Eliot* (1781) and Thompson (1782); *Lives of British Physicians*, 1830.

Fotheringhay, a parish and vil. of Northants, England, situated on the Nen, 9 m. S.W. of Peterborough. The parish has an acreage of 3100. A castle was built in the reign of the Conqueror, and rebuilt by the son of Edward III. Richard III. was b. here, and Mary Queen of Scots was imprisoned and executed. Pop. 200.

Foucault, Jean Bernard Léon (1819-68), a Fr. natural philosopher and mechanician, noted for his investigations in optics and mechanics. He perfected the process of Daguerre and Niépce, known as the 'daguerreotype process,' and worked with Fizeau and Arago. In 1844 he invented an apparatus for using electric light in optical experiments and microscopic researches. From 1845 he conducted the scientific *Journal des Débats*. F. demonstrated the earth's rotary motion by means of the pendulum, and invented the gyroscope (1851-52). After this his fame was firmly established. He became 'physician' to the Imperial Observatory, 1855, and

won the Copley Medal of the Royal Society for his researches concerning the velocity of light, showing it not to be the same in a vacuum as in the air. His scientific treatises form part of the *Bibliothèque d'instruction populaire*. F. became a member of the Academy of Sciences, 1865. He was about to undertake astronomical researches with the aid of physics when his health failed. See Lissajous, *Notice Historique sur la Vie et les Travaux de L. Foucault*, 1875; *Nouvelle Biographie Générale*; *Recueil des Travaux Scientifiques de L. Foucault* (Gariel et Bertrand), 1878.

Fouché, Joseph, Duc d'Otrante (c. 1759-1820), a Fr. statesman, brought up at the Oratoire. On the outbreak of the Revolution he was principal of the College of Nantes. In 1792 he represented Loire-Inférieure in the National Convention, and sided with the Montagnards. Chosen to organise the resistance to the rebellion of La Vendée and that at Lyons (1793), he assisted in the cruelties of Collot d'Herbois. Returning to Paris, he was elected Jacobin president, and helped to overthrow Robespierre. F. became minister of police at Paris (1799), retaining this office under Bonaparte till 1802. He was recalled in 1804, and granted various titles. After 1810 F. was replaced by Savary in Napoleon's favour, as he was suspected of intriguing with the Bourbons. For a time F. held office under Louis XVIII., but was forced to resign (1815), and d. an exile. His writings include *Notes aux Ministres Etrangers*, 1815; *Lettre au Duc de Wellington*, 1817; *Mémoires* (probably genuine), 1821. See Martel, *Etude sur Fouché*, 1873-79; Madelin, *Fouché* (new ed.), 1903; Brougham, *Historical Sketches*, iii., 1858; Welschinger, *Le Duc d'Enghien*, 1888.

Fouquet, Jean, see FOUQUET.

Fougères, a tn. of France, in the dept. of Ille-et-Vilaine. It is the cap. of that arron. also, and is situated 30 m. N.E. of Rennes. Leather, boots, and flannel are manufactured, and there are glass-works. F. has an anct. castle, and several interesting old churches. There is a monument erected to the soldiers who fell in 1870-1. Pop. 23,500.

Fouillée, Alfred Jules Emile (1838-1912), a Fr. philosopher, a member of the Academy of moral and political sciences, he greatly influenced modern philosophic thought. His *Mémoires sur la philosophie de Platon* (1867) and *Mémoires sur la philosophie de Socrate* were crowned by the Academy. Other works are: *La Liberté et le Déterminisme*, 1873; *Histoire de la philosophie*, 1875; *La*

Science sociale contemporaine, 1880; *Critique des Systèmes de morale contemporains*, 1883; *La Morale, l'Art, et la Religion, d'après Guyau*, 1889; *L'Evolutionisme des Idées-forces*, 1890; *Tempérament et Caractère*, 1895; *Psychologie du Peuple français*, 1898; *Le moralisme de Kant et l'amoralisme contemporain*, 1905; *La Morale des Idées-forces*, 1907. His wife wrote under the pseudonym 'G. Bruno.'

Foulahts, or Foulhas, see FULAHs.

Fould, Achille (1800-67), a Fr. financier and politician, of Jewish parentage. After the revolution of 1848 he was Minister of Finance, and as such introduced many innovations and improvements. He became Senator and Minister of State (1852-60). F. gave the first impulse to the foundation of the *Crédit Mobilier* (q.v.). He was reappointed Minister of Finance by Louis Napoleon (1861-7), having resigned (1852) on the confiscation of the property of the Orleans family. See *Biographie des Membres du Sénat*.

Foulis, Andrew (1712-75) and Robert (1707-76), two noted Glasgow printers, who set up their business in 1741. Robert became printer to the University in 1743. They followed their profession for over thirty years, issuing editions of Gk. and Latin classics, poetry, plays, translations, etc. Their 'immaculate' *Horace* (1744) is very famous, but has six misprints. Another famous work is the fine folio *Homer* (1756-8). In 1753 they founded an academy at Glasgow for engraving and modelling. The expenses incurred unfortunately proved their ruin. Their collection of 'old masters' was sold by auction at Christie's in 1776, after Andrew's death. Consult Duncan's *Literary History of Glasgow* (Maitland Club), 1831; Chambers, *Biographical Dictionary of Eminent Scotsmen*; Le-moine, *History of Printing*.

Foundations, in building, the base upon which the structure is built up, generally used of those parts of the building which are below the level of the ground and whose purpose is to determine the way in which the weight of the building shall be applied to the earth. In all buildings the weight is concentrated in certain small areas, the bases of walls, columns, etc. The aim of F. courses is to distribute that weight over as large a surface as possible, so that each square yard shall support as little weight as possible. The possibilities of well devised F. are illustrated by the construction of the Eiffel Tower, where a weight of 7500 tons is so distributed that each square foot sustains only 2½ cwt. The measures to be taken for the con-

struction of F. depend upon the weight of the building in comparison with the area of the base, the manner in which the weight is distributed, and the character and circumstances of the underlying earth. The character of land used for building varies from hard stable rock to loose sand or marshy soil. Between these extremes are gradations of soft rock, firm earth, hard compact clay, dry gravel, and dry close-packed sand. The presence or absence of water is a great consideration, as anything in the nature of a fluid F. is obviously unstable. The slope of the strata and the possibility of sliding effects are also matters of importance. In order to ascertain the methods and measures necessary, borings are made in the ground so that the succession and depth of strata may be determined. When the ground consists of hard rock little needs to be done except procuring a level surface upon which to build the walls. Where the F. is earth, a certain amount of excavation has to be done, and the first courses are laid down to a breadth exceeding the width of the walls to be supported. Usually, the excavations are filled in with concrete and the brickwork is laid on top of the concrete. According to the London Building Acts, the footings, or courses, laid nearest to the concrete, must project on each side to half the thickness of the wall and must diminish with each course to a height equal to at least two-thirds of the thickness of the wall. When the nature of the earth or the presence of water renders the natural F. unstable, it is necessary to have special F. to procure the requisite rigidity. For small buildings on soft ground, the distribution of the pressure may be effected by laying down a row of stout planks spiked together, and superposing another row of planks laid transversely, the brickwork then being commenced on the planking. For large buildings on loose and untrustworthy ground some method of piling is adopted. In the simplest cases piles shod with iron points and headed with metal bands are driven down by releasing a weight some distance above them. Where it is necessary to enclose thoroughly a section of earth, sheet piling is used. This consists of piles driven in at intervals and timbers driven in between so as to make a continuous wall; this prevents lateral shifting of loose earth. In providing for larger buildings, the piles are reinforced by concrete. The heads of the piles are rigidly connected and are set in concrete. Iron girders are also used to connect the various vertical supports

and the whole mass is set in concrete, thus giving the effect of a solid block of concrete underlying the whole area of the building. Concrete piles are often used for the building of bridges over rivers, or for heavy buildings on marshy land. The piles are made of blocks of Portland cement concrete sunk in by excavations made after they are placed in position. Sometimes cylinders of brickwork are constructed; these are gradually carried downwards and filled with blocks of concrete. This somewhat resembles the so-called 'well' F. employed for the Madras public buildings. A circular course of bricks about 3 ft. across is laid on the ground and firmly cemented together. The earth is then excavated within and without the circle so that the course sinks. Another course is then laid on top and the excavation proceeded with once more. In this way successive courses are built up, or rather allowed to sink down, to a depth of about 12 ft., and the inner space is filled with rubble. Where special circumstances make it impossible to sink a deep F. directly underneath a heavy wall, the cantilever system is sometimes adopted. The F. piers are sunk some distance from the wall to be supported, and steel cantilevers are run out from these piers to the wall; they are built into the wall at one end and are firmly secured to piers at the other. The difficulty of water which cannot be drained away is sometimes met by constructing what is called a 'dock' foundation. This consists of the construction of a closed wall of concrete built round a bed of concrete covering the whole area, thus forming a concrete tank which prevents the entrance of water. Cofferdams are also used in the construction of F. on wet sites. Wooden piles are driven down about 6 ft. apart and the intervals filled in with sheet-piles. A double wall of these piles is built enclosing the site, and the space between the boards is filled with clay puddle, thus forming a water-tight barrier which keeps the enclosure dry. The F. may then be laid within this temporary structure. See W. M. Patton, *A Practical Treatise on Foundations*.

Founders' Shares. When a limited liability company is formed, provision is usually made that, after outside shareholders have received a reasonable profit upon their investments, the original owners of the business or other founders of the company shall receive the larger share of benefit from any excess profit. In the early days of limited companies this was often contrived by the issue of F. S. to

these privileged persons. The plan worked fairly well in many cases, as the especial benefits they carried did not become operative until the public subscribers had obtained a satisfactory profit. It was discovered however by some rather unscrupulous promoters that, by the insertion of apparently innocent conditions and advantages for these special shares in the Articles of Association, it would be possible to saddle the outside investor with all the loss, and give him little of the profit. In consequence F. S. fell into disrepute, and the more satisfactory method of issuing Preference Shares was generally adopted where it was thought desirable to have two classes of Shareholders. The newer method gives the outside investor the first claim upon profit up to a certain percentage, but when he has received that share, he only benefits in any further profits that may be made in such a way as his arrangement or the Prospectus has defined. Preference shares are of so many kinds, and can be issued upon so many conditions, that there is no object now in issuing shares of which the popular record is unsavoury.

Founding, or Metal Casting, see CASTING.

Foundling Hospitals, or Asylums. Originally these were institutions for the rearing and care of children who were deserted by their parents, by means of private charity or at public expense. They were intended mainly to prevent infanticide or wilful procurement of abortion, and the exposure and abandonment of children.

The more enlightened Rom. emperors, Constantine, Valentinian, and Justinian, took measures to abolish such offences. In the sixth century the Bishop of Trèves ordained that the Church should support all children abandoned and placed in a marble basin by the cathedral porch. The capitularies of the Frankish kings mention similar arrangements. The Council of Nicea in A.D. 787 decreed that every city should have an institution for the care of neglected children, resulting in the first true F. H. (as now understood) at Milan (787), established by Datheus. Between the eleventh and fourteenth centuries many similar institutions followed this in France, Italy, and Germany. In France, especially, the subject has received much study and attention. Children were first received in the porch of Notre Dame at Paris. Marguerite de Valois opened a special home in 1536, but no sum was set aside by the state for the maintenance of the foundlings till 1552. The Bishop of Paris founded

the 'Couche,' but owing to limited accommodation children could only be taken in by drawing lots.

St. Vincent de Paul and Colbert, in the seventeenth century, tried to remedy the evils that had become prevalent, and the former established a home in 1638. Out of it grew the famous Paris Foundling Hospital, incorporated in 1670 under Louis XIV. The 'Couche' was united with it in 1688, and Marguerite de Valois' orphanage in 1772. This hospital takes in all *enfants assistés*, including illegitimate children and *enfants moralement abandonnés* (incorrigibles), as well as real foundlings (*enfants trouvés*), almost indiscriminately. The children are generally boarded out in the country after a few days, a sum being paid for their keep, but decreasing yearly and ceasing when the child is twelve years old. The child then usually becomes the apprentice or servant of its foster-parents, but is more or less under gov. supervision till the age of twenty-one. This institution also aims at helping poor parents, and allows the reclaiming of children at any time. In the United Kingdom and Germany the care of true foundlings is mostly left to private charity and the operations of poor law administration. Captain Coram's Foundling Hospital in London was established in 1739, but reserved for illegitimate children. Real foundlings and waifs and strays are admitted to the workhouses, Dr. Barnardo's Homes, Wantage Infant Orphan Asylum, or similar institutions. In the early nineteenth century an arrangement called the 'cradle-tour' (revolving basket or box) was in use for admitting children secretly. This system existed at Marseilles in the thirteenth century, but was much abused, and mostly abolished as illegal in 1834. Since 1801 children are admitted to the London Foundling Hospital only after personal examination of the mothers. The previous good character of the mother and her necessity, and the desertion or death of the father, must be known to the Committee. Admission is free, and no payment is taken; all children admitted must have had their applications approved before they were 2 months old; some live in the hospital, while others are boarded out. In 1925 the historic site was sold for £1,650,000, and the Governors temporarily housed the children in the former Royal Asylum of St. Anne's Society, Redhill, Surrey. In 1929 they completed the purchase of the Ashlyns Hall Estate, Berkhamsted, Herts, with 200 acs. of open land on a healthy altitude, for

the permanent establishment of the new Foundling Hospital. The London offices are 40 Brunswick Square, W.C. 1. The musical traditions inaugurated there by Handel are still kept up by bands. At Moscow and St. Petersburg (Leningrad) two such institutions were founded by Catherine II. (1729-96). They are to be found also in Italy, Austria, Spain, Scandinavia, China (Canton, 1856), Mexico, Buenos Ayres (1774), Rio de Janeiro, and elsewhere. There are many (mostly privately supported) homes in U.S.A., such as the almshouses, Sisters of Charity Foundling Asylum (1869), Infants' Hospital (1868), Infant Asylum (1871), all at New York. The Dublin Home (1701-1835) was closed owing to the high rate of mortality. The death-rate often ranged from 90 per cent. upwards, and averaged 75 per cent. In France and London, especially, this terribly high figure has now been reduced to about 4 per cent. and under. At Chicago the death-rate is also very low, largely owing to the practice of making it a rule that the mothers must attend the hospitals and nurse their own children. 'Baby-farms' are places where infants are boarded out for the sake of gain. Subject to no control or supervision, they are productive of shocking abuses, even serving to kill off illegitimate children. The Infant Life Protection Acts of 1872 and 1897 were designed to lessen this evil.

Consult Ferme and Montfalcon, *Histoire Statistique et Morale des Enfants Trouvés*, 1837; Epstein, *Studien zur Frage der Findelanstalten*, 1882; Sennichen, *Histoire des Enfants Abandonnés*, 1800; Folke, *Care of Neglected and Dependent Children*, 1901; Henderson, . . . *Dependents, Defectives, Delinquents*, 1901; *Modern Methods of Charity*, 1904; Devine, *Principles of Relief*, 1904; Hügel, *Die Findelhäuser und das Findelwesen Europas*, 1863; Lallemand, *Hist. des Enfants Abandonnés et Délaissés*, 1885; Emminghaus, *Das Armenwesen und die Armen gesetzgebung in Europäischen Staaten*, 1870 (partial Eng. translation by Eastwick for C.O.S., 1873); *Revue des Deux Mondes*, 1846, 1864, 1870.

Fountain (Fr. *fontaine*, from M. Lat. *fontana*, from Lat. *fons*, spring), a term applied to places where there is a continual flow of fresh water, either by artificial or natural means. The earliest existing example is that of the Babylonian F., dating from 3000 B.C., and next comes the Assyrian F. at Bavian, sculptured in the face of the rock and consisting of a series of basins descending in steps to the stream. Ancient Gk. Fs. of any

size were usually enclosed, and were common in the cities, springs being plentiful in Greece. They were dedicated to gods, goddesses, nymphs, deities, etc., and were frequently placed in or near temples. The water-supply of Rome was on a large scale, and the remains of the aqueducts form some of the most striking monuments of Italy. These supplied the baths and the public Fs., which were of a large size and numerous. Public and private Fs. were some of the most interesting of the Pompeian discoveries, the private ones were of rich and varied shapes, generally in the form of a niche. Utility was



FOUNTAIN WITH NYMPH

Formerly at the Villa di Castello, Florence;
now at the Villa di Patraia

the first object of a F. in early times, and in towns where a number of people might require to draw water at the same time a large basin was erected with a pillar in the centre, from which pipes, each with a separate jet to supply the running water, radiated all round. Many examples of this kind of F. remain throughout Italy and in the old Ger. towns, and a modern reproduction of the kind is to be seen at Holyrood Palace, Edinburgh. Drinking Fs. for wayfarers, as well as horses and other animals, are commonly placed in streets and public resorts, and the Metropolitan Drinking Fountain Association was formed in London in 1859.

Fountain Pen. An ingenious contrivance so arranged that the pen-

holder is a hollow shaft and serves as a reservoir for ink, releasing it at a sufficiently rapid rate to maintain a steady flow, no matter at what speed it may be used. At first the difficulty of producing a pen that was always fluent for varying rates of speed but capable of retaining ink, without leakage, when not in use, was not easily overcome, but a workable feed was ultimately evolved, the principle of which is, that air can only be admitted to release the ink and cause it to flow as the tiny sub-reservoirs around the nib become empty. For a long time most pens needed to be charged with ink by means of an independent filler, but latterly an indiarubber bag has been made, on which a bar, raised or depressed by means of a lever, fills or expels the ink as required.

Fountains Abbey, a Cistercian abbey of W. Riding of Yorkshire, England, 3 m. from Ripon, suppressed in 1540. It was first founded in 1132 by Thurstan, Archbishop of York. The abbey offers every variety of style, from the Norman to the Perpendicular, including a vaulted cloister of two aisles, 300 ft. in length, a refectory, and a chapter house.

Fouqué, Friedrich Heinrich Karl de la Motte (1777-1843), a Ger. writer, novelist, and poet of the Romantic movement, b. at Brandenburg. For some years he served in the Prussian army, taking part in the Rhine campaign of 1794. The rest of his life he devoted chiefly to literary pursuits, living mainly at Paris, Nennhausen, and Halle, where for nine years he lectured on modern history and poetry. Between 1810 and 1815 F.'s popularity was at its height, and he wrote numerous novels, romances, plays, and epics. The earliest and best known of his works is *Undine*, a classic of romanticism which appeared in 1811, and is the work by which his memory now lives. Amongst other publications may be mentioned, *Der Zauberring*, and *Die Jährten Thiodulfs des Isländers*, 1815. For F.'s life see *Lebensgeschichte des Baron Friedrich de la Motte Fouqué*.

Fouquet (or Foucquet), Jean (c. 1415-c. 85), a Fr. painter, miniaturist, illuminator, and painter to Louis XI. His miniatures rival those of Clovis and Attavante. His famous portrait of Charles VII. dates from 1442. F. was invited to Rome, 1443, to paint the portrait of Pope Eugenius IV. On returning to France (c. 1453), he painted the miniatures illustrating a Fr. translation of Boccaccio (now in Royal Library, Munich). Portions of the famous 'Livre d'Heures' are in the Brentano-Laroche collection

at Frankfort. The Antwerp Gallery contains his 'Virgin and Child' (tradition says that the Virgin is a portrait of Agnes Sorel). In 1461 F. painted forty miniatures for Etienne Chevalier, Charles VII.'s treasurer. He united the manner of Van Eyck with the Italian style, and influenced contemporary painters largely. See writings of Count Leon de Laborde, Brentano, Count de Bastard; Lafenestre, *Jehan Fouquet*, 1902.

Fouquet, Nicholas, Vicomte de Melun et de Vaux, Marquis de Belle-Isle (1615-80), superintendent of finance in France under Louis XIV., b. in Paris, and the son of a Fr. nobleman in the confidence of Richelieu. He was educated for the civil service and held several responsible posts while in his teens, and was made Commissioner of Police, Justice, and Finance in the Dauphiné. In 1650, through the influence of Mazarin, he was given the important position of Procureur-Général to the Parlement of Paris. As Minister of Finance, F.'s fortune, largely acquired by fraudulent operations, surpassed even Mazarin's, and the latter's successor, Colbert, who was instructed to inquire into the state of the finances, secretly influenced the king against F. He was finally arrested at Nantes and charged with malfeasance in office to the king's detriment and sentenced to imprisonment for life. See Chéruel, *Mémoires sur le vie publique et privée de Fouquet*, 1862; and Lair, *Nicholas Fouquet*, 1890, etc.

Fouquier-Tinville, Antoine Quentin (1746-95), a Fr. revolutionist, the public accuser of the Tribunal during the Reign of Terror, b. at Hérouël. Here, for a time, he practised law, and then came to Paris, where he turned spy. He was one of the fiercest of democrats on the outbreak of the Revolution, and his activity earned him the reputation of one of the most terrible and sinister figures of the Revolution. As public accuser, he was as ruthless as Robespierre himself. He denounced impartially, and brought to the guillotine with equal fervour all parties, performing the duties of his office with a blood-thirsty relentlessness. With the fall of Robespierre and the Terrorists, his career came to an end, and he was brought to trial, condemned to death, and guillotined in May 1795. See Domenget, *Fouquier-Tinville et le tribunal révolutionnaire de Paris*, 1880-82; and George Lecocq, *Notes et documents sur Fouquier-Tinville*, 1885.

Fourchambault, a tn. of France, in the dept. of Nièvre, situated on the Loire 4½ m. N.W. of Nevers. It is

noted for its mineral springs, and has important iron and steel works, with manufs. of nails and wire. Pop. 4936.

Fourcroy, Antoine François, Comte de (1755-1809), a Fr. chemist, and the son of a druggist, b. in Paris. He studied medicine, and in 1780 obtained his degree as a doctor. In 1784 he became lecturer in chemistry at the college of the Jardin du Roi, which position he held for twenty-five years. He was one of the earliest converts of Lavoisier's theories, in conjunction with whom, together with Berthollet and De Morveau, he prepared the *Méthode de Nomenclature Chimique*, 1787. He was a member of the committees of public instruction and public safety, and during the time of his service took a leading part in improving the system of public education. He organised the Ecole Polytechnique, and instituted schools of medicine. In 1801, under Napoleon, he became director-general of Public Instruction. The Royal Society's *Catalogue of Scientific Papers* enumerates fifty-nine memoirs by F.

Fourier, François Marie Charles (1772-1837), a Fr. socialist writer, b. at Besançon. He was educated at the college in his native town and then travelled in France, Germany, and Holland. He inherited a considerable sum of money on his father's death, but this he subsequently lost at the siege of Lyons, all his property, in which he had invested his inheritance, being destroyed. He then entered the army, but was discharged on account of ill-health. He afterwards turned his attention to mercantile pursuits, and obtained sufficient by this means to satisfy his wants and devote his leisure time to the elaboration of his first work on the organisation of society. This is entitled, *Théorie des quatre mouvements et des destinées générales*. This work contains his whole system, and was later republished under the title *Théorie de l'unité universelle*, and *Le nouveau monde industriel, ou invention du procédé d'industrie attrayante et combinée distribuée en séries passionnées*. *Le nouveau monde industriel* is probably the most finished exposition of F.'s views, and on its publication in 1830 he began to attract some attention, adherents gathering round him.

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1888; Sambuc, *Le Socialisme de Fourier*, 1900; H. Bourgin, *Fourier, contribution à l'étude de socialisme français*, 1905.

Fourier, Jean Baptiste Joseph (1768-1830), a famous Fr. mathematician, b. at Auxerre, was educated at the military school in his native town, and afterwards taught mathematics in the same institution. In 1795 he became professor in the Ecole Normale at Paris, which he shortly left for the Polytechnique. In 1798 he accompanied Bonaparte to Egypt, and took a prominent part in the gov. He returned to France in 1801, became prefect of Isère, holding that office until the return of Bonaparte from Elba, when he was dismissed. In 1817 he was elected to the Académie des Sciences, and in 1826 was admitted member of the French Academy. F. was a voluminous and versatile writer. His chief interest was mathematics and mathematical physics, but he entered into the public life of the time with an enlightened enthusiasm. On his return from Egypt he contributed to the *Description de l'Egypte*. In 1822 he published *La Théorie Analytique de la Chaleur*, which had formed part of a thesis awarded a prize by the Académie des Sciences in 1812. *Analyse des équations indéterminées* was published in 1831, after his death. In 1889-90 his works were collected and published under the name of *Œuvres de Fourier*. F. is best remembered for his development of the series which bears his name. The general form of the series is that of the representation of the function of a variable between fixed limits by a series of sines or cosines, as

$$a_1 \sin \frac{\pi x}{l} + a_2 \sin \frac{2\pi x}{l} + \dots + a_n \sin \frac{n\pi x}{l} \\ + \dots \text{ and } b_0 + b_1 \cos \frac{\pi x}{l} + b_2 \cos \frac{2\pi x}{l} \\ + \dots + b_n \cos \frac{n\pi x}{l} + \dots,$$

where the limits are 0 and l . The investigation and criticism of the series were continued by such mathematicians as Dirichlet, Riemann, Cantor, Lebesgué, etc.

Four Lakes, a chain of lakes situated in co. Dane, Wisconsin, U.S.A. They are connected by short canals, and upon an isthmus between the lakes Mendota and Monona is the city of Madison, which is the capital of the state.

Fourmies, a tn. of France, in the dept. of Nord, and the arron. of Avesnes, situated on a trib. of the R. Sambre, 40 m. S.E. of Valenciennes. It is an important industrial centre; wool combing and spinning are largely carried on, and cloth is manu-

factured. There are iron-works, forges, and foundries, and glass factories. Pop. 13,000.

Fourteen Points. A code of Allied war aims set forth by President Woodrow Wilson before Congress on Jan. 8, 1918; which for clarity and liberality was in marked contrast to the vagueness and reactionary character of the ideals of the professional diplomatists of *Mittel Europa*. The F. P. were instrumental at a critical period in rallying the spirits of many of the oppressed nationalities of Central Europe. The Points were: (1) open covenants of peace and no secret diplomacy; (2) freedom of navigation in peace and war outside territorial waters, except where seas may be closed by international action; (3) removal of economic barriers; (4) adequate guarantees for reduction of armaments; (5) an absolutely impartial adjustment of all colonial claims, the interests of the peoples concerned having equal weight with the equitable claim of the Gov. whose title is to be determined; (6) all Russian territory to be evacuated and Russia to be given full opportunity for self-development with the aid of the Powers; (7) complete evacuation of Belgium and restoration of Belgium without any limit to Belgian sovereignty; (8) all Fr. territory to be freed, invaded portions to be restored, and the wrong by Prussia in regard to Alsace-Lorraine to be righted; (9) Italian frontiers to be adjusted on lines of nationality; (10) peoples of Austria-Hungary to be given an opportunity of autonomous development; (11) Rumania, Serbia, and Montenegro to be evacuated, Serbia to have access to the sea, and the relations of the Balkan States to be settled on lines of allegiance and nationality under international guarantees; (12) Non-Turkish nationalities of the Ottoman Empire to be assured of autonomous development and the Dardanelles to be free to all ships; (13) Polish independence to be restored, the independent state to include territories inhabited by indisputably Polish populations and to have access to the sea; (14) a general association of nations to be formed under specific covenants to afford mutual guarantees of political independence and territorial integrity to both great and small states. In Oct. 1918 numerous diplomatic notes were exchanged between Germany and the U.S.A., at a time when the Ger. Gov. realised that their military forces were doomed to defeat, in which Germany endeavoured to obtain some modification of this 'charter of Allied

aims,' but were gradually brought to realise that Wilson would only recommend a cessation of hostilities on condition of unreserved acceptance by Germany of the F. P. The translation into practical politics of the celebrated F. P. imposed difficulties on the most experienced diplomatists and statesmen, trained as were the majority in an atmosphere foreign to the idealism of this code. But at the very opening of the Versailles Treaty figures the creation of the League of Nations bound together by covenant; and much has since that time been accomplished in the matter of the reduction of armaments; while the map of Europe was remade on lines which as far as practicable appear to conform to the principle of self-determination. (See COVENANT; EUROPE; PEACE CONFERENCE (1919); VERSAILLES, TREATY OF.)

Fourth Estate. Edmund Burke, in alluding to the three estates of the realm, viz. lords, clergy, and commons, constituting the British parliament, termed the public Press the F. E., by reason of the enormous influence journalism exerts over both imperial and domestic affairs.

Fourth Party, the name applied to a small opposition group within the English Conservative party about 1880, under the leadership of Lord Randolph Churchill in the House of Commons. He had active coadjutors in Sir Hy. Drummond Wolff and Sir John Gorst, and occasionally received the assistance of Mr. A. J. (later, Earl) Balfour. The F. P. made itself conspicuous in 1880 and the succeeding years by its vigorous attacks upon the recognised leaders of both parties. See Winston Churchill's *Life of Lord Randolph Churchill*, 1906; and H. E. Gorst's *The Fourth Party*, 1905.

Fowey, a par. and tn. of Cornwall, England, situated on the R. Fowey, 28 m. S.W. of Devonport, and 280 m. from London. In early times it was an important seaport, and ships for the Crusades were fitted out here. In the reign of Edward III. the tn. equipped a fleet of forty-seven vessels, and about 800 men, for the siege of Calais. The inhabitants were in later times convicted of piracy, and were deprived of their vessels. Queen Victoria and the Prince Consort visited the town in 1846. The principal industry is pilchard fishing, and there is a deep and sheltered harbour. The chief exports are chinastone and iron ore. There is a coastguard and lifeboat station. Pop. 3170.

Fowl, see POULTRY.

Fowler, John (1820-64). b. at Melksham in Wiltshire. An Eng. inventor, chiefly famous for his steam

plough, in which the plough is moved by traction of a stationary engine. This was first employed with satisfactory results in 1850 in the drainage of Hainault Forest in Essex. F. was also the inventor of other improved agricultural machines.

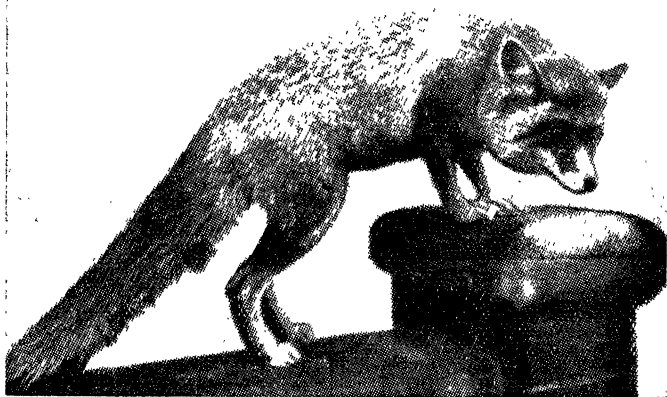
Fowler, Thomas (1832-1904), an Eng. philosopher, b. in Lincolnshire. He received his education at King William's College, Isle of Man, and at Merton College, Oxford, where he graduated in 1854. In 1881 he was elected president of Corpus Christi College, which position he filled till his death; and from 1873-88 he was professor of logic at Oxford. From 1899-1901 he was vice-chancellor of the University of Oxford. His publications include: *The Elements of Deductive Logic*, 1867 (10th ed., 1892); *The Elements of Inductive Logic*, 1870 (6th ed., 1892); *Locke*, in *English Men of Letters*, 1880; *Bacon's Novum Organum*, 1889; *Francis Bacon*, 1881; *Locke's Conduct of the Understanding* (3rd ed., 1890); *History of Corpus Christi College*, 1898; *Progressive Morality*; *An Essay in Ethics*, 1895, etc.

Fowling, the hunting and catching of birds and wild fowl generally, viz. swans, geese, and the different varieties of ducks—canvashacks, redheads, mallards, teal, pintail, and wood ducks, etc. F. is performed in a variety of ways, such as by concealment of the hunter, by decoy, or occasionally, in some parts, by the training of dogs and ponies to attract the birds. (See WILD FOWL.)

Fox (Dutch *vos*; Ger. *fuchs*), a name properly applicable only to the British representative of the family Canidae but now used to include many other species. The feminine form, 'vixen,' represents the old Eng. 'fyxen,' (fox) plus the feminine termination *-en*. The genus F. (*Vulpes alopec*) is distinct from the genus Canis by the slighter build, the long and bushy tail, and the large ears of the members of the former. Also the projection behind the eye-socket has its upper surface concave, with a raised ridge, instead of regularly convex as in the genus Canis, and there is not a hollow chamber within the frontal bone of the forehead. The range of the F. extends eastwards across Europe to Japan, and to the S. across N. Africa, Persia, N.W. India, and the N. American side of the Atlantic. Naturally, over such an area many local differences are found, and the red F. of N.W. Europe differs considerably from the white-footed F. of Persia and Arabia, whilst both are in many respects dissimilar to the black F. of N. America. Among other

varieties may be mentioned the Himalayan F. (*Vulpes alopec montanus*), the Tibetan F. (*V. a. wadelli*), the Alaskan F. (*V. a. harrimani*), the largest species, the Indian F. (*V. a. bengalensis*), the *Vulpes famelicus* of Egypt, the Arctic F., etc. The American grey F. (*Urocyon cinereus argentatus*) is a separate sub-genus of *Canis*, whilst the long-eared F. of S. and E. Africa forms a distinct genus. The skins of many varieties of the F. are valuable, and are largely imported into this country for furs. The cunning of the Eng. F., which owes its continuance to the sport of fox-hunting, is well known. The vixen brings forth a litter of from five to eight cubs in April, the period of gestation being sixty to sixty-five

less attraction for him. F. entered parliament when he was in his twentieth year, and after he attained his majority he was made by Lord North a Lord of the Admiralty, which office he held only until 1772, when he resigned in order to be at liberty to oppose the Royal Marriage Act. He proved himself so excellent a debater that North persuaded him to rejoin the ministry at the end of the year as a Lord of the Treasury, but his independence was so marked that the king insisted upon his dismissal. In opposition, he attacked vigorously the ministerial policy which cost England the U.S.A. In 1782 he became Foreign Secretary under Rockingham, but on the death of his chief refused to serve



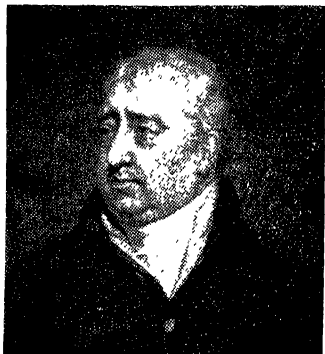
INDIAN FOX

days. The cubs take eighteen months to grow to their full size and strength; the average life of the F. is about thirteen years.

Fox, Charles James (1749-1806), a statesman, third son of Henry F., first Baron Holland; was one of the most popular men of his day and one of the most charming of any age. As a lad, encouraged by his father who desired to make a man of him, to ape the vices of those older than himself, he became a heavy drinker and a reckless gambler. At cards and dice he lost a great fortune, but Lord Holland and his friends always came to his rescue, albeit on one occasion before assistance was forthcoming his furniture was sold for the benefit of his creditors. In later life, however, the gaming-table had

under Shelburne. In the following year he formed a coalition with North, becoming joint-Secretary of State with him under the Duke of Portland, but was dismissed in Dec., when, by the king's intervention, his India Bill was thrown out. The king, who disapproved of F.'s opinions and resented his friendship with and his influence over the Prince of Wales, was determined never again to let him take office, and he managed to exclude him from the Coalition Ministry of 1804, but two years later, when Grenville became Prime Minister, had to accept him as Foreign Secretary. Thus, by the irony of fate, F., who had been in opposition for more than three-and-twenty years died in office. He d. on Sept. 13, aged fifty-seven, and was

buried in Westminster Abbey, close by his great opponent, Pitt, who had predeceased him by a few months. F. had little or no opportunity to show what ability he possessed as a constructive statesman, but as a leader of opposition he proved himself the right man in the right place. His readiness in reply, his power of speaking at any time and on any subject, made him invaluable to his party, and his eloquence was always a thorn in the side of the Ministry. His personal popularity kept his party together, though his approval of the



CHARLES JAMES FOX

Fr. Revolution caused a political and personal breach between him and Burke, who could see no good in it. F. was an ardent Whig, and had a healthy passion for opposing all abuses and restrictions of the liberty of the subject. Only a few days before his death he brought in a measure to abolish the slave trade. There are biographies by Lord Russell and Sir G. O. Trevelyan.

Fox, George (1624-91), the founder of the Society of Friends or Quakers. He was *b.* in Fenny Drayton, Leicestershire, and was the son of a weaver, Christopher F. At an early age he was apprenticed to a shoemaker, who also traded in cattle and wool. He was of a spiritual disposition, and while tending the sheep was occupied in holy meditation. At the age of nineteen he felt he had a divine call, and in consequence left his home and friends and 'brake off all familiarity or fellowship with old or young.' For the following four years he wandered about the country, with Bible in hand, attending meetings, conversing with 'professors,' and publicly expressing his disapproval

of 'steeple-houses,' church bells, and all kinds of formalism, religious and social. About 1646-47 he began to realise an 'inner light' in his heart, which appeared to him to be a divine revelation. He not infrequently interrupted services when the preacher was teaching doctrines which seemed to him erroneous, and in 1649 he was imprisoned at Nottingham for so doing. In the following year he was again imprisoned in Derby on a charge of blasphemy, and on his release walked barefoot through Lichfield, cursing the town with the words, 'Woe to the bloody city of Lichfield.' Between the years 1653 and 1673 he was imprisoned on six different occasions. During his whole life, in fact, he was continually subjected to persecutions. He gathered together a faithful band of followers, of whom there were, in 1656, nearly a thousand in gaol. In manner and speech they separated themselves from their fellows, saying 'thee' and 'thou' to 'all men and women without any respect to rich or poor.' They interpreted Christ's words literally, and thus opposed war and the taking of oaths, and advocated poor relief and self-help. F. also taught that the Sacrament of the Lord's Supper and Baptism were not essential, and that there was no need for an ordained or paid ministry. He visited Barbados, Jamaica, and America in 1671, and Holland in 1677 and 1684. His *Journal* was published in 1694. The complete list of his writings occupies fifty-three pages of Joseph Smith's *Descriptive Catalogue of Friends' Books*, 1868. See Lives by Janney, Dr. Hodgkin, and J. S. Rowntree. Also consult Bickley's *Fox and the Early Quakers*, 1884.

Fox, Henry, first Baron Holland; and **Fox, Henry Richard Vassall, third Baron Holland**, see HOLLAND.

Fox, Richard (*d.* 1528), a bishop and statesman, *b.* at Ropesley; educated at Oxford. He was a trusted adviser of Henry VII., and held the posts of Secretary of State, Privy Seal, Bishop of Exeter (1487), of Bath and Wells (1492-4), of Durham (1494-1501), and of Winchester, besides performing many diplomatic missions. In 1516 he retired from court and founded Corpus Christi College, Oxford.

Fox-bat, see FRUIT BAT.

Foxye, John, (1516-87), an English martyrologist, *b.* in Boston, Lincolnshire. He entered the University of Oxford, taking both the bachelor's and master's degrees in 1537 and 1543 respectively, being elected a full fellow of Magdalen College in 1539. He applied himself assiduously to the

study of theology, and became a convert to the principles of the Reformation in 1545, resigning his fellowship in consequence. He then went abroad and gained a livelihood by correcting the press for an eminent printer at Basle. In the reign of Elizabeth he returned to England and came under the notice of the Duchess of Richmond, through whose influence he eventually obtained employment as tutor to the children of her brother, the Earl of Surrey. In 1550 F. was ordained deacon by Ridley, Bishop of London, and began preaching the doctrines of the Reformation. He was ordained priest in 1560, and three years later was made a prebendary in Salisbury Cathedral by the influence of Cecil. He held successively the livings of Shipton and Cripplegate, but soon resigned these, and for a year held a stall at Durham. The work that has immortalised F.'s name is his *History of the Acts and Monuments of the Church*, known as *Foxe's Book of Martyrs*, on which, however, reliance for historical accuracy may not be placed. The first Eng. edition appeared in 1563, and it has since gone through innumerable editions, the best ones being by Cattley, Mendham and Pratt, and Stoughton. Besides this F. wrote numerous controversial and other works. F. d. in London, and was buried in the chancel of St. Giles', Cripplegate.

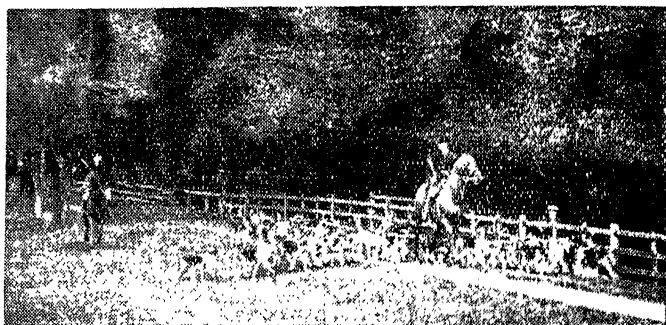
Foxhound, a small hound especially trained for fox-hunting. It has been most carefully bred and reared for over 300 years: it is a combination of the old southern hound, with its keen nose, and a greyhound, with its swift foot. It possesses great staying powers, and is often used to work in thick coverts or run across open fields for ten hours at a stretch. F's. are hunted in packs, generally dogs and bitches separately. The dogs stand 24 in. at the shoulder, and the bitches 20 or 21 in. The puppies are entered at cub-hunting in company with older hounds, so that, in being trained for hunting, their natural faults may be quickly cured. In many packs it is still the custom to 'round' the dog's ears at about four months old, so that there may be less likelihood of their getting torn in brushwood. The hounds are annually drafted to make room for the puppies. The chief points of a F. are as follows: Head large and full, with a girth in front of the ears of at least 16 in.; ears set low, close to the head; nose, with wide-open nostrils, should measure 4½ in.; neck free from all throatiness; shoulders long, muscular, and well-sloped; back short and strong; loin

square, with a slight arch; legs absolutely straight and very strong; feet round and cat-like, with good strong pads; hind-quarters strong, straight stifles preferred; stern, arched over the back, hairy below, and tapering to the end; coat short, thick, and glossy; colour not very important, and varying between black, white, and tan, black and white, and pied with hare, badger, tan, or yellow.

Fox-hunting, as practised at the present time, is not of very great antiquity. Foxes existed in this country from early times, and they were 'hunted' in the days of Edward I., but such 'hunting' was as different from F. proper as light from dark. William Twin, who was head huntsman to Edward II., mentions the fox as belonging to the 'inferior' class of animals that should be exterminated by any means, and again in the *Records of the Chase*, written in the time of Edward III., the fox is named with contumely. In those times Reynard was pursued with no ceremony or method, but caught in nets, or shot, or dug up from his earth and slaughtered at every possible opportunity. Such views prevailed until the eighteenth century, when F. began to take its place as a sport. It is not possible to say with exactitude when the first pack of hounds was maintained in England entirely for F., but the following facts throw some light on the matter. In a letter from one of his descendants, it is stated that Lord Arundale, between 1690 and 1700, kept a pack of foxhounds which were maintained in the family until they became the property of the celebrated Hugh Maynell in 1782. *The Field* of Nov. 6, 1875, describes a horn, which is now the property of Thomas d'Avenante, Esq. The inscription on this reads: 'Thomas Boothby, Esq., Tooley Park, Leicester. With this horn he hunted the first pack of foxhounds then in England for fifty-five years. Born 1677. Died 1752.' These statements are not conclusive, as the packs mentioned may not have hunted foxes exclusively, but they serve to indicate the probable truth of the statement in Lord Wilton's *Sports and Pastimes of England* that hounds began to be entered solely to fox about 1750. In the early days of F. the procedure was somewhat different from the present. The meet took place in the early hours of the morning, and the fox was traced by his 'drag,' that is, the line he had taken on his return from a foraging expedition on the previous night. The drawback to such a course was that a fox was very liable to be scared by the hounds on the

'drag' scent, and make good his escape before they caught the real scent. Now, owing to the decrease in woods, etc., it is considered the better way to find the fox in his kennel, and the hour of the meet is retarded until about eleven in the forenoon. When the fox 'breaks away' from the covert he is allowed to travel for some little distance before the alarm is given, in order that he may not retrace his steps into the covert. The rules which govern scent are as little understood to-day as ever. On some days when all things seem propitious the scent will fail, and *vice versa*. It is thought by some that the manner in which hounds come out of covert may be taken as an indication; if they dwell for some moments before

to small kennels in the N. of England. If a pack hunts for five days in the week, or possibly six, as some do, about 75 couples of hounds will be required; if four days are hunted, from 50 to 60 couples; or if only two days, from 25 to 30 couples. A hound begins cub-hunting at the age of about eighteen months, and is then probably of the first class for three or four more seasons. Many hounds last longer than this, and it is recorded of 'Potentate,' a noted hound belonging to the Duke of Bedford, that he hunted for eleven seasons. The pick of the hunting in this country is supposed to be in 'the Shires,' a somewhat arbitrary term, which is supposed to mean Leicestershire, Northamptonshire, and Rutlandshire, but



[The Times]

HUNTSMAN AND PACK OF HOUNDS

settling to the line the scent is good, but if the scent be poor they will make all haste not to lose it. An easterly wind is probably the best for scent, in spite of the poet who sings of 'a southerly wind and a cloudy sky.' An extraordinary circumstance is that if the fox is coured at any period of the run by a dog, the scent fails after that point. The most dreaded foe of the fox-hunter is of course frost. The hunting season proper begins in Nov.; but during part of Sept., the actual date of starting varying according to the time of harvest in different parts of the country, and the whole of Oct. 'cub-hunting' is carried on. The object of this is indicated by the name, to 'blood' young hounds, and teach them their business. Cub-hunting is commenced in the early morning, about 4 a.m., and the fox is hunted by the 'drag.' The size of packs naturally varies from very large establishments in 'the Shires'

does not exactly correspond with these. The packs which are considered the best are Belvoir, the Cottesmore, the Quorn, and the Pytchley. Despite various agitations and remonstrances, the sport of F. has not declined in popularity of recent years; but the active work of the League for the Prohibition of Cruel Sports (101 Chandos House, Westminster, S.W. 1.) has forced the fox-hunting fraternity into forming a society called the British Field Sports Protection Society. In 1931 there were 219 packs of hounds in the British Isles—183 in England and Wales, 26 in Ireland, and 10 in Scotland. As regards the cost of hunting, it may be taken as a rough estimate that for every day in the week that hounds hunt, the cost per annum will be between £500 and £600; various local circumstances will influence the cost in each case, but it will not as a rule fall below £500. Any price may be given for hunters, from £30 to

£800; several hundreds of horses, ranging in price from 200 guineas to 650 or 700 guineas, passing annually through the hands of Tattersall's in London and Warner Sheppard and Wade's in Leicester. If a man wishes to hunt regularly with a pack in the Shires, he must, of course, have a far greater establishment than a man who hunts in the North. The sums of money that are spent on hunting every year in this country are very large and many persons are employed in connection with the sport. The officials of a hunt comprise the master (M.F.H.), one or two 'whippers-in,' and a kennel huntsman or 'feeder.' If the huntsman is an amateur, he is also invariably the master; if the master does not hunt his own hounds, a paid huntsman is employed. In large packs two whippers-in are employed, but in some packs only one. The duties of whipper-in and kennel huntsman are often performed by one person, especially if the master hunts his own hounds. The kennel huntsman proper is the man who undertakes all responsibility connected with the hunt, save the actual hunting, walks out the pack, prepares the food for the pack that is hunting, etc. It was, however, the opinion of Lord Willoughby de Broke, one of the foremost authorities, that the man who hunts the hounds should also feed them. It is the first duty of a huntsman to gain the confidence of his hounds; the sagacity and resource of a well-trained pack are remarkable. The whipper-in, or whippers-in, when the hounds are drawing a covert, should be neither too near nor too far away from the hounds; when they have found, he should get to them as soon as possible, and take a line parallel to that of the huntsman, and prevent the pack from dividing. The quality of the hunting enjoyed at the present day is probably as good as ever it was. Great care is exercised in the breeding of hounds and of horses, and the pace is set, on the whole, faster of late years. F. is by no means confined to England at the present time, but has been transported to various quarters of the globe. Manitoba has had a pack since 1826, and the Peshawur Vale hounds in India are as celebrated as the Belvoir or Quorn in England. The enthusiasm of the garrisons at Alexandria and Cyprus caused hunting to be instituted there, and among other places where the sport is carried on may be mentioned Florida, where meets are held in moonlight, Bechuanaland, New Zealand, and parts of the U.S.A. There are 83 packs of hounds hunted in the U.S.A. See T. F. Dale's *The Fox: Natural His-*

tory, etc., 1906, and *Fox-hunting in the Shires*, 1903; H. S. Davenport's *Memories at Random of Mellon and Harborough*, 1926; C. Simpson's *Leicestershire and its Hunts*, 1926; Sabretache's *Shires and Provinces*, 1926, and *More Shires*, 1928; W. Fawcett's *Hunting in Northumbria*, 1927; H. A. Bryden's *Horn and Hound*, 1927; C. F. G. R. Schwerdt's *Hampshire Hunt*, 1929; T. R. Quarrell's *Worcestershire Hunt*, 1929; L. D. R. Edwards' *Huntsmen Past and Present*, 1929; Siegfried Sassoon's *Memoirs of a Fox-hunting Man*, 1929; Lord C. C. Bentinck's *Lord Henry Bentinck's Foxhounds*, 1930; also J. S. Reeve's *Fox-hunting Recollections*, 1928; A. H. Higginson and J. A. Chamberlain's *Hunting in the United States and Canada*, 1928.

Fox River, the name of two rivers of Wisconsin, U.S.A. (1) The Fox or Pishtaka R. has a course of 220 m., flowing first S., then S.W., entering the Illinois at Ottawa. (2) The Fox or Neenah R. has a generally N.E. course for 250 m. In the wet season the floods spread and a natural connection is established between Lake Michigan and the Mississippi. By means of a canal, however, ships can pass all the year round.

Fox-shark, or **Thresher**, the name given to *Alopias vulpes*, the commonest species of sharks found in the Mediterranean and the Atlantic. Its chief characteristic is a very long tail, nearly half of its own length, which is from 12 to 18 ft.; with this appendage it lashes the water furiously, hence its name. The F. follows the shoals of small fish, such as herrings or pilchards, and destroys them in great quantities.

Fox-terrier, a small dog used formerly to run with hounds, and it is probable that the F. has developed from these small hunting dogs. They were used particularly to unearth foxes from holes, but since the speed of hounds has increased, it has been found impossible for such comparatively small dogs to keep up with the chase. Smooth-haired terriers were first exhibited about the middle of the nineteenth century, and have become very popular as house dogs. The rough-haired variety were exhibited in 1872. Fs. make intelligent and affectionate companions. Though not snappy and quarrelsome, they are always ready for a fight, and make excellent ratters. The chief points are: Head long, flat, and narrow, with very strong teeth, small ears, small keen eyes, black nose, and clean cheeks; shoulders sloping; forelegs very straight and bony, with firm, compact feet and arched toes; chest and fore-ribs narrow; hocks

strong; stifles well bent; tail, which is usually cut short in puppyhood, is held erect; colour, white with black or tan markings, brindle spots being objectionable. The smooth-haired variety should have a thick, dense, and smooth coat; the rough-haired, coarse, wiry, and rather longer. Weight, 15 to 18 lb. Consult Rawdon B. Lee, *History of the Fox-terrier*, 1889; Robert Leighton, *The Complete Book of the Dog*, 1922 (revised 1927).

Foy, Maximilien Sébastien (1775–1825), a distinguished Fr. military officer and orator, b. at Ham in Somme, France. He entered the army at the early age of fifteen, and made his first campaign in 1792, serving with distinction under Dumouriez, Moreau, Schoenburg, and Masséna. In 1800 he was made adjutant-general in the army of the Rhine, and three years later he served under Marmont in the Austrian campaign. In 1808 he fought in the Peninsula under Junot, Soult, and Masséna, distinguishing himself in the retreat into France. It was in the campaign of 1815 that he chiefly distinguished himself, however, receiving his fifteenth wound on the field of Waterloo, refusing, nevertheless, to quit his post till the close of the engagement. He was afterwards employed as inspector-general of infantry, and in 1819 was elected a member of the Chamber of Deputies, where he displayed his powers as an orator. From his MSS. his widow, in 1827, published *Histoire de la guerre de la Péninsule*.

Fra Angelico, see ANGELICO, FRA.

Fra Bartolommeo, see BARTOLOMEO DI PAGHOLE DEL FATTORINO, FRA.

Fracastoro, Girolamo (1483–1553), an Italian physician and poet, b. at Verona; studied at Padua, becoming learned in medicine and belles-lettres. In 1502 he became professor of philosophy at Padua, and later practised as a physician in Verona. Among his intimate friends were Cardinal Bembo, Julius Scaliger, and Giambattista Ramusio. Among his works are *Syphilidibus, seu Morbi Gallici*, 1530 (Eng. trans., 1686); a medical poem, *De vini temperatura*, 1534; *Homocentricorum*, 1535; *De sympathia et antipathia rerum*, 1546; and *De contagionibus*, 1546. His *Opera Omnia* were published at Venice in 1555, and his poems at Padua in 1728.

Fraction, in mathematics, a number which indicates one or more equal parts of a whole. A *vulgar fraction* is expressed by means of two numbers, thus $\frac{3}{4}$ or $\frac{3}{4}$. The upper, or first, number is called the *numerator* of the F.; the lower, or second number is

called the *denominator* of the F. The denominator indicates the number of parts into which the whole (or unit) is divided, and the numerator indicates the number of those parts taken to form the F.; thus, $\frac{3}{4}$ of £1 means three parts, each of which is a $\frac{1}{4}$ of £1, therefore the measure of the F. is 15s. A F. is termed *proper* when the numerator is less than the denominator, *improper* when the numerator is greater than the denominator. An improper F. can, therefore, be expressed as a mixed number, i.e. a number of wholes + a F.; thus $\frac{7}{4} = 1\frac{3}{4}$. A F. may be indicated in many ways, according to the number of parts expressed by the denominator, thus $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$, etc., that is to say, if the numerator and denominator be both multiplied, or both divided, by the same number, the value of the F. is unaltered. The division may result in a *complex F.*; thus, $\frac{5}{2} = 2\frac{1}{2}$. Addition and subtraction of Fs. are performed by bringing both denominators to a common multiple; thus, $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$. To multiply two Fs. we multiply both numerators and both denominators; for instance, to multiply $\frac{1}{2}$ by $\frac{2}{3}$, we take first $\frac{1}{2}$ of a seventh part, that is, 5 sixty-thirds of the unit; but $\frac{2}{3}$ of $\frac{1}{2}$ is six times as much, that is, it equals $\frac{1}{3}$. A decimal F. is indicated by a succession of digits after a decimal point. These digits indicate the numerators of vulgar Fs. whose denominators are 10, 100, 1000, and so on successively. It is only when the denominator of a vulgar F. contains factors of 2 and 5 that it can be expressed as an ordinary, or terminating, decimal, as it is only in those circumstances that its denominator can be expressed as a power of 10, that is, as 1 followed by noughts. Where there are other factors in the denominator, the vulgar F. is expressed as a *recurring decimal F.* In algebra the same rules apply for the generalised symbols as in

arithmetic; $\frac{a}{b}$ and $\frac{a+b}{a-b}$ are thus

algebraical Fs. The form $\frac{1}{a+1}$
 $\frac{b+1}{c+1}$, etc.,

is called a *continued F.*

Fracture, in surgery, the breaking of any part of the bony structure of the body. The general cause of F. is a stress too great for the integrity of the bone to be maintained. The stress may result from direct violence, when the bone is directly acted upon by some external force; in this case the interposed soft tissues are usually crushed and lacerated. It may also

result from indirect violence, when the shock is distributed through various parts of the skeleton, the weaker bone or part of a bone being broken; for instance, a fall on the outstretched hands is likely to cause F. of the collar-bone, although that is to some extent remote from the seat of violence. A F. may be *simple*, when the softer tissues are unwounded, or *compound*, when the broken end ruptures the skin. It may be *fissured*, when the bone is only cracked; *comminuted*, when the bone is separated into several pieces; or *impacted*, when one broken end is telescoped into the other. *Greenstick* F. occurs in children, and consists of a bent and splintered bone. F. is rendered more

bone has joined, gradually increasing movement is advocated in order to accustom the muscles, tendons, etc., to the resumption of their functions.

Fracture, in geology, the characteristic appearance of the broken surfaces of minerals when they are broken in directions other than cleavage planes. The various types of Fs. are (1) *smooth*, where there are no marked irregularities; (2) *splintery*, where the surface is covered with partly detached splinters; this F. is characteristic of minerals of fibrous structure; (3) *hackly*, where the surface is covered with sharp irregularities of varying shape; (4) *conchoidal*, where the surfaces are smooth and curved.

Fra Diavolo (properly Michele Pezza), see DIAVOLO, FRA.

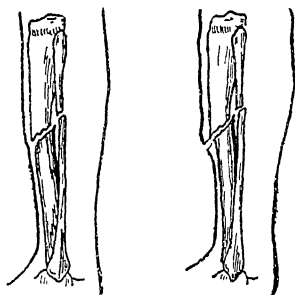
Fragaria, or *Fragraria*, see STRAW-BERRY.

Fragonard, Jean Honoré (1732-1806), a Fr. painter, b. at Grasse, Provence; studied under Chardin and Boucher in 1752, won the Prix de Rome. He then went to Italy, and was much influenced by the work of the Venetian painter Tiepolo. He illustrated St. Non's *Voyage de Naples et de Sicile*. In 1765 he returned to France, and executed 'Callirhoe,' commissioned by Louis XV. for reproduction in tapestry. He produced several decorative paintings and many landscapes, and also worked in pastel and water-colour and engraved, but his best known works are genre paintings of contemporary life, notable for their humanity, free-drawing, and charming colour. Many are in the Louvre, including 'Bacchante Asleep,' 'Nymphs at the Bath,' 'Music Lesson,' 'The Guitar Player,' 'Cupid and a Girl,' 'The Happy Mother,' and 'The Cradle.'

Framboesia, see YAWS.

Framlingham, a tn. of Middlesex co., Massachusetts, U.S.A., on Sudbury R., 21 m. W. of Boston. It includes South F. and Saxonville. There are manufs. of blankets and other woollens, straw and rubber goods, and boots and shoes. It was settled in 1647 as Daniorth's Plantation and incorporated as F. in 1700. A state normal school is situated here. Pop. 22,210.

Framlingham, a tn. of Suffolk, England, 22 m. N.E. of Ipswich. The town is built round a spacious marketplace, and contains a fine flint-work church (in which are tombs of several notable Howards), the Albert College (1864), and the Castle. This last, dating from Edwardian times, was largely destroyed in 1650. It served as a stronghold for the Bigods, the Mowbrays, and the Howards, and



DIAGRAMS TO SHOW HOW A SIMPLE FRACTURE OF THE LEG MAY BECOME COMPOUND

Both tibia and fibula are fractured

likely by any morbid condition weakening the condition of the bone, by the condition of old age, when bone becomes more brittle, and by frosty weather, when not only is the ground harder and more slippery, but the bones themselves appear to be affected. F. may be recognised by the helpless condition of the limb. After this sign further investigation must be carried on with the minimum of movement. There may be local inflammation, and in the limbs considerable distortion may take place owing to the lack of resistance to contraction of muscle. An unmistakable symptom is *crepitus*, by which is meant the grating sensation of the broken pieces passing over each other; this symptom should never be looked for except by a surgeon. The treatment is mainly expectant; the broken ends are fitted accurately together, and the part is secured by splints or other apparatus to secure immobility. When the

was the refuge of Queen Mary after Edward VI.'s death. Pop. 2369.

Frampton, Sir George James, (1860-1928), Eng. sculptor. He studied under W. S. Frith, entered the Royal Academy schools in 1881, gained the gold medal and travelling studentship in 1887, and studied in Paris under Mercié and Dagnan-Bouveret. In 1894 he exhibited at the Royal Academy and was elected an associate. In 1900 he gained the *medaille d'honneur* at the Paris Exposition. He was elected a Royal Academician in 1908, and knighted in the same year, and during 1911-12 was president of the Royal Society of British Sculptors. Among his works are: 'Lamia,' the Mitchell memorial at Newcastle, the Keene memorial, the Queen Victoria memorial at Calcutta, and the sculpture on many famous buildings, such as the Constitutional Club and the Glasgow Art Galleries. Died at St. John's Wood, May 21.

Franc, The, is the unit of French money. The name dates back to the fourteenth century, when, in 1360, a gold coin was struck bearing the effigy of King John II. on horseback and the legend *Johannes Dei Gracia Francorum Rex*. This particular coin went out of use in the latter half of the fifteenth century, and silver francs bearing the figure of the king were struck in Paris from 1578 onwards. These pieces were worth about 2 francs 60 c. of Fr. money at pre-war value. But it was in 1793, just after the Fr. Revolution, the F. assumed the value (about 10*l.* in Eng. money) which it bore with slight variations from that date up to 1914. On Dec. 23, 1865, an agreement was signed by several European countries by which they bound themselves in the Latin Monetary Union to adopt the decimal system of the Fr. F. In Switzerland the unit is called the F., in Italy the lira and in Greece the drachma. The F. is divided into 100 centimes. Like the monies of the other European belligerents, the Fr. F. suffered a very serious fall in value during the Great War. It dropped gradually till it reached $\frac{1}{2}$ of its value as against gold. And it is owing to the energetic measures adopted and carried out by Raymond Poincaré that the value of the F. was stabilised at 124·21 to the £1. As a temporary measure tokens of 1 fr., 2 fr. and of 50 c. in aluminium bronze were issued from 1920 on by French Chambers of Commerce.

Francavilla, a com. of Messina prov., Sicily, 10 m. N.W. of Taormina, and 27 m. N. of Catania. Pop. 5505.

Francavilla-Fontana, a com. of prov. Lecce, Apulia, Italy, 20 m. S.W. of Brindisi. It has manufs. of leather and textiles. Pop. (commune) 19,000.

France is a large republic of W. Europe, lying between 51° 5' and 42° 20' N. lat., and 4° 42' W. and 7° 39' E. long. It is bounded on the N. by the Eng. Channel and the Strait of Dover; on the S. by the Mediterranean Sea and Spain; on the E. by Belgium, Germany, Switzerland, and Italy; and on the W. by the Bay of Biscay. It is well defended by natural boundaries, the Vosges Mts. being on the Ger. frontier, the Juras on the Swiss, the Alps on the Italian, and the Pyrenees on the Spanish. Only on the Belgian frontier is there no natural protection, but here a strong line of fortresses had been erected, though all were reduced by the Ger. invasion of 1914. The country is very compact in shape, somewhat like an irregular hexagon. Its greatest length is 660 m., and its greatest breadth 540 m. The pre-war area was 207,054 sq. m., but owing to the restoration of Alsace-Lorraine by the Treaty of Versailles, the present area is 212,659 sq. m. (including Corsica, 3367 sq. m.). F. has a length of coast line of 1500 m. It is washed by three seas: the Mediterranean, the Bay of Biscay, and the Eng. Channel. The Mediterranean has several good harbours in the E. part, but the W. part is flat and not easy of access. The W. coast is deficient in good harbours, many of them having been constructed at great outlay. The Riviera coast is bold and lofty, but that of the Bay of Biscay is flat, with a chain of dunes, or sand-hills, near the shore, behind which lagoons are formed in many places. The Brittany coast is rugged and fringed with islands. F. has, however, no islands of importance. Corsica is, geographically, rather a part of Italy, though politically belonging to France, and the Channel Islands belong to England. The biggest islands are Belle Isle, Isle de Ré, and Isle d'Oléron in the Bay of Biscay. The surface of F. is generally level. High lands are found in the E. and S.E. only. The N. and W. parts, exclusive of the heights in Brittany, consist of low lands which form part of the great central plain of Europe. E. of the dunes, between the Pyrenees and the Gironde, is a barren stretch of sand called 'Landes,' which is covered with coarse grass. In the S. central part of the country lie the Auvergne Mts., a cluster of heights of volcanic origin rising to between 5000 and 6000 ft., and forming a watershed whence rise the Loire,

the Allier, and the Dordogne. Between the Auvergne Mts. and the Mediterranean is a chain known as the Cevennes, which rise to some 6000 ft. Their S. slopes are fertile and sunny, while the N. slopes are high-lying and dreary. N. of the Cevennes and skirting the Rhone and the Saône lies a low range of hills some 2000 ft. in height, known as the Côte d'Or, while to the E. of the N. portion of the Côte d'Or rises the lower end of the Vosges Mts., some 4000 ft. in height. The slopes of the Vosges are covered with thick forests. To the S. of the Vosges are the Jura Mts., separated from the former by a narrow depression through which runs the Saône-Rhone Canal. The Jura Mts. are over 5000 ft. in height, clothed with forests, and supporting a dense population, engaged mainly in cattle breeding and agriculture. S. of the Jura Mts. and separated from them by the valley of the Rhone, which here widens out into Lake Geneva, are the Alps, containing Mt. Blanc (15,732 ft.). The Alps are divided into several chains, including the Pennine Alps in Savoy, with Mt. Blanc and the Graian, and Cottian Alps farther S. The Savoy Alps are largely visited by tourists, Chamonix being a well-known resort, but the Graian Alps are thinly populated. The Pyrenees on the S. frontier rise to a height of 10,000 ft. (Mt. Nethou, 11,168 ft.) and possess but few passes. The principal is the pass of Roncevaux, 40 m. from the Atlantic coast, celebrated as the scene of the death of Roland in covering the return of Charlemagne's army from Spain after war with the Saracens. Other passes are those of Perche and Pertus in the E., near the Mediterranean coast. Owing to the height of the passes, railways do not traverse the Pyrenees, the routes between France and Spain lying close to the sea-board. In the E. Pyrenees is the little republic of Andorra, 175 sq. m. in area, inhabited by 6000 people.

The largest rivs. in France are the Loire, Garonne, Dordogne, and Adour flowing into the Bay of Biscay, the Seine and Somme into the Eng. Channel, and the Rhone into the Mediterranean. The Loire is the longest riv. in F., being over 600 m. in length. Its principal tributaries are the Sarthe on the right bank, and the Allier, Cher, and Vienne on the left. With its tributaries the Loire drains an area of some 47,000 sq. m., a fifth part of the whole of F. Rising to the N. of the Cevennes, it flows in a northerly direction, gradually changing to westerly until Orleans is reached, from which point it flows W.

by S. until it enters the sea. The country it serves is the finest in F., consisting of rich agricultural and pasture lands, and vineyards towards the mouth. It enters the sea by a broad estuary, at the head of which stands the port of Nantes. The riv. here is too shallow for large vessels, so another port, St. Nazaire, has been made at the foot of the estuary on the N. bank. Unfortunately, the bed of the Loire contains many sand-banks which, combined with its immense floods, greatly detract from its value as a navigable stream. The Rhone is 500 m. in length. It rises in the glaciers of the St. Gothard group of mountains, the celebrated Rhone glacier lying just N. of the Furka Pass. Before its entry into F. it flows through Lake Geneva, and the upper portion of its course is between mountain ranges. On reaching Fr. territory it flows through the plain of Dauphiné until it receives the waters of the Saône at Lyons, when it turns at right angles and flows due S. to the Mediterranean. Besides the Saône, with its sub-tributary the Doubs, the Rhone receives on its left bank the Isère and Durance. Its valley is sharply delimited by the Alps and the Cevennes, while the bed of the Saône and the Doubs is enclosed by the Côte d'Or Mts. and the Vosges and Jura chains. The lower part of the Rhone Valley is covered with vineyards. The mountains lying so near the riv. on both sides, their torrents give it an impetuous flow that renders it of little use for navigation. Moreover, the Mediterranean being practically tideless, the soil washed down quickly deposits at the mouth and chokes it up. The Saône and Doubs are, however, tranquil streams on which a good deal of domestic traffic is carried on. The quantity of water discharged by the Rhone is so great that it exceeds that of all other Fr. rivs. put together. The Seine is 485 m. in length. It rises N. of Dijon and flows in a north-westerly direction. On its right it receives the Marne and Oise, and on its left the Yonne. Its flow is regular and calm. Upon its banks stands Paris, and at its mouth Le Havre, the second port of F. The stream is easily navigable, and ships of considerable tonnage can go up as far as Rouen, 56 m. from Le Havre. The Garonne, 346 m. in length, rises in Spain and flows, after making a broad easterly sweep, N.W. into the Gironde estuary at Bordeaux. It receives on its right bank the Lot, Tarn, and Dordogne, all of which rise in the Auvergne Mts. Though the torrential rains cause frequent floods on the Garonne, it is neverthe-

less a stream of great importance for navigation. The territory it waters and the banks of the Gironde are mainly devoted to the cultivation of the vine.

Climate.—Owing to its proximity to the sea, the climate of F. is, on the whole, temperate. It feels the moderating effect of the Gulf stream, not, however, to so great an extent as England. The winters are mild and the summers not overbearingly hot. The prevailing wind is westerly, and brings many rainy days, especially on the coast of Brittany, where it rains some 170 days during the year. The rain is, however, very slight, and the annual rainfall is therefore small, being only some 20 ins. Snow is not very heavy in the plains, but is, of course, abundant on the Pyrenees and Alps, as well as in the mountainous districts of the centre. The north-eastern highlands have a climate resembling that of Central Europe. The climate of Brittany corresponds closely to that of the S.W. coast of England, and is more moderate than the rest of F. In Paris the extremes are greater, but even here the average temperature during the winter is only 36° F., and the hot spell during the summer is not of long duration. The rainfall in Paris is 150 days per annum. The climate of the Mediterranean seaboard is of a sub-tropical character, the winter being temperate and the summer intensely hot. It is moderated, however, by the 'mistral,' a cold, boisterous wind which blows with great force from the Central Plateau, and which, by driving off the moist air from the Mediterranean, lessens the frequency of rainfall along the Riviera.

Agriculture and land tenure.—The soil of F., enjoying genial sunshine and frequent showers, is on the whole very fertile. The total agricultural land (including Alsace-Lorraine) is 136,101,760 ac. and of this 99,095,049 ac. are under crops, fallow, or grass, 25,521,108 forest, and 11,485,603 moorland or uncultivated. Wheat is the chief object of culture, and the ground yields an average of 18 bushels per acre. The area under wheat is 17,000,000 acres. Next in order of importance among the cereals are oats, rye, barley, buckwheat, and maize. Beetroot is also considerably cultivated for the purpose of making sugar, and nearly 1,000,000 acres are devoted to it. Over 3,000,000 ac. are under vines, and although F. is the greatest wine producing country of the world, its yield being 1,000,000,000 gallons per annum, nevertheless the imports of this commodity from Italy and

Spain greatly exceed the exports. Cider is also made on a very large scale in the N., some 250,000,000 gallons being produced annually. In the S. of F. mulberry trees are specially cultivated for silkworms, particularly in Provence, Dauphiné, and Languedoc. There are about 65,000 producers, and the annual produce is between two and three thousand metric tons. Tobacco is a government monopoly and is largely grown in the basins of the Garonne and Rhone. The largest forests are those of Compiègne, Ardennes, Fontainebleau, Orléans, and the Vosges, the trees being chiefly oak, birch, pine, elm, and beech.

Industry.—In mineral wealth F. is much poorer than England. Coal and iron are widely diffused, but are found far away from one another, which greatly increases the cost of production. The coal mines engage over 100,000 persons, and the annual output is about 40,000,000 tons. The principal coal fields are in the N.E., near Belgium, in the valley of the Upper Loire, around St. Etienne, and around Creuzot on the Canal du Centre. By the Treaty of Versailles the coal deposits of the Saar basin are to be exploited by F. for fifteen years, and at the end of that time the future possession of the area is to be decided by plebiscite. The production of iron ore has increased, the annual average being some 45,000,000 long tons. The principal producing district is in the valley of the Moselle near Nancy, Longwy, and Briey. Other deposits are worked near Creuzot and recently also in the west, near Caen in Normandy. Other minerals are not very abundant. Copper, zinc, lead, tin, nickel, and gold are produced, but not nearly in sufficient quantities to satisfy the nation's demands. Salt is produced from brine pans on the shores of the Mediterranean and the Bay of Biscay, while rock salt is found in great quantities near Nancy in the N.E. The annual production of rock salt is some 1,500,000 long tons, while the potash deposits in Alsace near Mulhouse produce about 1,000,000 tons annually. The country is very rich in granite, building stone, plaster, chalk, and slates. F. ranks as one of the leading manufacturing countries of the world, and engages some 9,000,000 people in manufacturing industries. The main textile industries are silk, woollen, cotton, and linen. The silk industry is chiefly carried on around Lyons in the Rhone Valley, also at Nîmes, Paris, St. Etienne, Tours, and other towns. Over 250,000 persons are engaged in

the cultivation of silkworms and in the manufacture of the product. Though F. no longer monopolises the world's silk trade, she is nevertheless the principal nation engaged in this industry. Woollen and cotton goods are chiefly made at Roubaix, Lille, and St. Quentin on the Belgian frontier, and at Rouen. Linen goods are made at Dunkirk and other northern towns, but the industry is fairly general throughout F. Leather goods are manufactured at Paris, Blois, Marseilles, and boots and shoes at Paris, Marseilles, and

the home of a great number of small industries, no less than a quarter of the total output being produced in the capital and its environs. The fishing industry is a considerable source of wealth, and employs over 130,000 persons. Apart from the Newfoundland fisheries, sardines and mackerel are caught in the Bay of Biscay, and tunny off Corsica. Whaling is also carried on from Dunkirk.

Foreign trade.—The Fr. mercantile navy numbers (1929) 1422 steamers, 56 motor ships, and 184 sailing boats.



AMIENS

(D. McLeish)

Toulouse. After Belgium, F. is the leading country for lace, which is largely manufactured in the N.E., especially at Valenciennes. The sugar industry is protected by heavy tariffs, and gives employment to some 28,000 persons. F. is also the chief glove producing country of the world, Paris and Grenoble being the centres of the industry. The country is also noted for its dyeing and calico printing; its production of ceramic ware and glass, its porcelain, for which Sèvres is specially renowned; its millinery, haberdashery, fancy goods, perfumes, furniture, bronzes, and other objects of art and luxury. Paris is especially

The gross tonnage is 3,378,663, and the navy ranks sixth, after Great Britain, the U.S.A., Japan, Germany and Norway. Figures for 1929 show that 32,071 vessels entered Fr. ports, with a net tonnage of 58,091,343, of which 14,426,216 tons were ships of Fr. nationality, while 25,961 ships of 49,192,613 tons (12,772,845 Fr.) were, cleared. The leading ports are Marseilles, which does a quarter of the whole of Fr. shipping, Le Havre, Bordeaux, Nantes, Dunkirk, and St. Nazaire. Fr. imports in 1929 amounted to 6,728,000 tons food products (value 13,178,000,000 francs), 50,604,000 raw materials (value 35,160,000,000 frs.), and 2,115,000

tons manufactured articles (value 9,947,000,000 frs.), while the exports were 1,510,000 tons food products (value 6,068,000,000 frs.), 33,019,000 tons raw materials (value 12,564,000,000 frs.), and 5,360,000 tons manufactured articles (value 31,440,000,000 frs.). The average value of trade with the U.K. from 1925-1929 is £61,000,000 imports and £26,000,000 exports, and value of trade with the U.S.A. is 53,000,000 dollars imports and 159,000,000 dollars exports.

Communications.—The compactness of Fr. territory is very favourable to the development of good communications. Possessing as it does all kinds of stone and road-making material, it has been able to construct a fine system of highways, due principally to the energy of Napoleon. There are now about 25,000 m. of national roads, 11,000 m. of departmental roads, and 400,000 m. of local roads. The central position of the capital also rendered it possible to plan a convenient system of railways radiating to all parts of the country. The railways are leased to private companies by the State, which has the option of taking them over when the lease falls in. The Western Railway connecting Paris with Brest, Cherbourg, and Le Havre is now controlled by the State. Other lines are the Northern Railway, connecting Paris with Calais, Lille, Valenciennes; the Orleans Railway to Bordeaux and Toulouse; the Eastern to Strasbourg, Belfort, and Basle; and the Paris-Lyon-Mediterranean Railway, and the Midi through Toulouse to the Mediterranean and the Pyrenees. The total mileage, including the State-run Alsace and Lorraine system (1384 m.), is 25,766. The Paris-Orleans, the P.L.M., and the Midi are in process of electrification.

Its 150 navigable streams provide over 5000 m. of internal communication, and they are connected by canals which add another 3000 m. of navigable route. The Fr. system of canals is the finest in Europe. The chief among them are the Marne and Rhine Canal, which connects the Rhine with the Seine, crossing the Vosges at the height of 1110 ft.; the Canal du Centre, connecting the Saône with the Loire; the Canal de Bourgogne, connecting the Saône with the Yonne, crossing the Côte d'Or near Dijon at the height of 1200 ft.; the Canal D'Alsace, or the Rhine and Rhône Canal, and the Canal du Midi, connecting the Bay of Biscay with the Mediterranean by joining the Garonne at Toulouse with Cette.

Paris is one of the world centres for

civil aviation, and from Le Bourget aerodrome air-lines go out to London, to Marseilles, to Brussels and Amsterdam, to Vienna and Constantinople, to Prague and Varsovie, to Cologne and Berlin, and to Berlin and Moscow. In 1926 a subterranean telephone line was opened between Paris and Strasbourg (494 km.). There are in Fr. 16,000 post offices, 4000 telegraph offices, and 17,000 public telephones. The Fr. submarine cable system covers about 75,000 km., the longest being Brest-New York and Brest-Casablanca-Dakar. There are four broadcasting stations in Paris and one at Lyons, Bordeaux, and Toulouse. Thirty-five stations for wireless telegraphy are owned by the State, and of these six are open to the public.

Population.—The soil of Fr. was occupied in early historical times by a mixture of races, of which the Celtic Gauls preponderated. The shores along the Mediterranean were occupied by the Ligurians, the S.W. by Iberians, and the N.E. by the Belgæ, Ger. immigrants who had adopted the Celtic language. Subsequently came the invasion of the Phœnicians and the Gks., the latter of whom founded Massilia, the present Marseilles. Cæsar subjugated the land and laid it open to Rom. influences. At the end of the fourth century began the invasion of the Teutonic tribes, and in the ninth century those of the Northmen or Normans. This mixture of races has produced the Fr. nation. The Bretons of Brittany, descended from the anct. Celts, have not been assimilated to the rest of the nation, and some million and a quarter still use Breton as their native tongue, although about half of them also speak Fr. In the S. near the Pyrenees, some 125,000 persons speak Basque, while Flemish is spoken in Fr. Flanders, and Walloon in the N.E. of Fr. Considerable differences are to be found in the inhabitants of the various parts of Fr. The N. Frenchman is taller in stature, less vivacious than the S., the latter being darker in complexion and of more volatile disposition. The natives of different provs. exhibit different characteristics. The Gascons are loquacious and boastful, the men from the centre uplands reserved and slow to make friends; the Breton melancholy and mystical; the Norman tall and self-controlled. As a nation the Fr. are gay and vivacious, renowned for politeness and sociability, artistic in their tastes, frugal and thrifty, capable of periods of great enthusiasm and liable to corresponding periods of depression. They are of great practical sense and ex-

remely good organisers. The pop. of F. is 40,743,851 (1926). The pop. per sq. m. (about 190) is very low, considering the fertility of the country. The following is a list of the Departments with their areas in sq. m. and pops.: Ain (2248; pop. 317,195); Aisne (2866; pop. 488,999); Allier (2848; pop. 370,562); Alpes, Basses (2697; pop. 88,347); Alpes, Hautes (2178; pop. 87,963); Alpes-Maritimes (1443; pop. 435,253); Ardèche (2144; pop. 289,263); Ardennes (2027; pop. 297,448); Ariège (1892; pop. 167,498); Aube (2326; 238,253); Aude (2448; pop. 291,951); Aveyron (3385; pop. 328,886); Belfort (235; pop. 96,591); Bouches-du Rhône (2025; pop. 929,549); Calvados (2197; pop. 390,492); Cantal (2229; pop. 196,999); Charente (2305; pop. 312,790); Charente-Inférieure (2791; pop. 417,789); Cher (2819; pop. 298,389); Corrèze (2272; pop. 269,289); Corsica (3367; pop. 289,890); Côte-d'Or (3391; pop. 328,881); Côtes-du-Nord (2786; pop. 552,788); Creuse (2163; pop. 219,148); Dordogne (3550; pop. 392,489); Doubs (2052; pop. 296,591); Drôme (2532; pop. 263,750); Eure (2330; pop. 308,445); Eure-et-Loir (2291; pop. 255,213); Finistère (2729; pop. 753,702); Gard (2270; pop. 402,601); Garonne, Haute (2457; pop. 431,505); Gers (2428; pop. 196,419); Gironde (4140; pop. 827,973); Hérault (2402; pop. 500,575); Ille-et-Vilaine (2697; pop. 561,688); Indre (2664; pop. 255,095); Indre-et-Loire (2377; pop. 334,486); Isère (3178; pop. 558,079); Jura (1951; pop. 230,685); Landes (3604; pop. 263,111); Loir-et-Cher (2478; pop. 248,099); Loire (1852; pop. 669,216); Loire, Haute (1930; pop. 260,610); Loire, Inférieure (2693; pop. 651,487); Loir-et-V. (2629; pop. 341,225); Lot (2017; pop. 171,776); Lot-et-Garonne (2078; pop. 246,809); Lozère (1996; pop. 104,773); Maine-et-Loire (2811; pop. 477,741); Manche (2475; pop. 431,367); Marne (3167; pop. 397,773); Marne, Haute (2420; pop. 195,370); Mayenne (1886; pop. 259,934); Meurthe-et-Moselle (2036; pop. 552,087); Meuse (2408; pop. 218,131); Morbihan (2738; pop. 543,175); Moselle (2403; pop. 519,052); Nièvre (2658; pop. 260,502); Nord (2228; pop. 1,969,159); Oise (2272; pop. 405,971); Orne (2371; pop. 277,637); Pas-de-Calais (2606; pop. 1,171,912); Puy-de-Dôme (3090; pop. 515,399); Pyrénées, Basses (2977; pop. 414,556); Pyrénées, Hautes (1750; pop. 187,875); Pyrénées, Orientales (1598; 229,979); Rhin, Bas (1848; pop. 670,985); Rhin, Haut (1354;

pop. 490,654); Rhône (1104; pop. 993,915); Saône, Haute (2074; pop. 226,313); Saône-et-Loire (3330; pop. 459,240); Sarthe (2410; pop. 387,482); Savoie (2388; pop. 231,210); Savoie, Haute (1774; pop. 245,317); Seine (185; pop. 4,628,637); Seine, Inférieure (2448; pop. 885,299); Seine-et-Marne (2275; pop. 380,017); Seine-et-Oise (2184; pop. 1,137,524); Sèvres, Deux (2337; pop. 309,820); Somme (2443; pop. 473,916); Tarn (2231; pop. 301,717); Tarn-et-Garonne (1440; pop. 164,191); Var (2333; pop. 347,932); Vaucluse (1381; pop. 230,549); Vendée (2690; pop. 395,602); Vienne (2711; pop. 310,474); Vienne, Haute (2119; pop. 351,311); Vosges (2303; pop. 382,100); Yonne (2892; pop. 277,230).

There is a tendency for the pop. to concentrate in the towns, seventeen of which have over 100,000 inhabs., viz.: Paris, 2,871,429; Marseilles, 652,196; Lyons, 570,840; Bordeaux, 256,026; Lille, 201,921; St. Etienne, 194,000; Nantes, 184,500; Nice, 184,000; Toulouse, 181,000; Strasbourg, 174,000; Le Havre, 158,000; Rouen, 123,000; Roubaix, 117,000; Toulon, 115,000; Nancy, 114,000; Clermont-Ferrand, 112,000; Rheims, 101,000. The Fr. do not emigrate very much, but, on the contrary, many foreigners make their homes in F., there being now over 2,500,000 aliens. The div. of the pop. into trades is as follows: agriculture, 9,000,000; mining, 300,000; manufactures, 6,000,000; commerce, 2,000,000; transport, 1,000,000; professions, 600,000; public service, 1,000,000.

Constitution.—F. has been a republic since the overthrow of the empire of Napoleon III. in 1870. The present constitution is highly central and retains many forms which have survived from the times of the kings and the emperors. It was definitely settled by the law of 1875. The country is composed of communes, each of which elects a mayor and communal council to control its affairs. Every group of ten or more communes forms a canton, and the cantons are further grouped into arrondissements. Each arrondissement elects a council which controls local taxation. The arrondissements are grouped into departments, each of which contains on an average some four arrondissements. The departments have replaced the old historical provs. into which F. was formerly divided, and are ninety in number, excluding three in Algeria, but including Corsica. The following is a list of the old Fr. provs., together

with the Departments to which they roughly correspond:—Alsace-Lorraine (Moselle, Rhin-Bas, Rhin-Haut); Angoumois (part of Charente-Inf.); Anjou (Maine-et-Loire, parts of Sarthe, Mayenne, and Indre-et-Loire); Artois (part of Pas-de-Calais); Aunis (part of Charente-Inf.); Auvergne (parts of Puy-de-Dôme, Cantal, and Haute-Loire); Avignon (part of Vaucluse); Bearn (Basses-Pyrénées); Berri (Cher and Indre); Bourbonnois (parts of Puy-de-Dôme, Creuse, and Cher); Brittany (Finistère, Côtes-du-Nord, Morbihan, and Loire-Inf.); Burgundy (Saône-et-Loire, Côte-

Aude, Hérault, Gard, Ardèche, parts of Haute-Loire, Haute-Garonne, and Tarn-et-Garonne); Limousin (Corrèze, part of Haute-Vienne); Lorraine (Meurthe-Moselle, Meuse, and Vosges); Lyonnais (Rhône and Loire); Maine (Mayenne); Marche, La (Creuse); Nivernais (Nièvre, part of Cher); Normandy (Seine-Inf., Eure, Calvados, Manche, and Orne); Orléannais (Loiret, Loir-et-Cher), and parts of Eure-et-Loir, Nièvre, and Yonne); Picardy (parts of Pas-de-Calais, Somme, Nord, Oise, and Aisne); Poitou (parts of Vienne, Vendée, and Deux-Sèvres); Provence



THE CURIOUS VOLCANIC ROCKS OF LE PUY

[D. Mc Leish

The nearer, 280 ft. high, is crowned by the church of St. Michel d'Aiguille dating from 962. The further, 435 ft. high, is surmounted by a gilded statue of the Virgin and Child composed of the metal of over 200 Russian cannon taken at Sebastopol.

d'Or, and parts of Yonne and Nièvre); Champagne (Ardennes, Marne, Aube, and Haute-Marne, and parts of Aisne, Seine-et-Marne, and Yonne); Dauphiné (Drôme, Hautes-Alpes, and Isère); Flanders (Nord); Foix (part of Ariège); Franche-Comté (Doubs, Haute-Saône, and Jura); Gascony (Landes, Gers, Hautes-Pyrénées, part of Basses-Pyrénées); Guienne (Gironde, Dordogne, Lot-et-Garonne, Lot, Tarn-et-Garonne, Landes, Gers, parts of Hautes-Pyrénées, Haute-Gironde, Ariège, and Basses-Pyrénées); Ile de France (Seine-et-Oise, Seine-et-Marne, Aisne, Oise, parts of Eure-et-Loir, Loiret, and Yonne); Languedoc (Tarn, Bouches-du-Rhône, Var, Basses-

Alpes, and part of Vaucluse); Roussillon (Pyrénées-Orientales); Saintonge (part of Charente-Inf.); Touraine (part of Indre-et-Loire). The departments have each a general council, whose proceedings are watched by the prefect appointed by the Gov. The legislative power of the country is vested in the two houses—the Chamber of Deputies and the Senate. The Chamber of Deputies is elected for four years by manhood suffrage, and consists of 584 members, including six for Algeria and ten for the other colonies. The Senate formerly contained 300 members, but with the return of

Alsace-Lorraine the number is 314. By the revision of 1884, when the provisional character of the Constitution was removed, the life-membership of senators was abolished. Senators are now elected for nine years by an Electoral College in each Department. One third of the Senate is re-elected every three years. Every new law must be passed by both Houses. The executive power is vested in the President of the Republic elected for seven years by the Chamber of Deputies and the Senate united in the National Assembly. He is supported by a body of ministers whom he selects from the Chamber of Deputies. The judicial system is under direct control of the Gov. Justices of the peace exist in each canton for deciding small cases. Larger issues must be brought before the district tribunals. In criminal cases the preliminary investigation is carried on by an official under secrecy, and the accused is not allowed benefit of counsel until the case comes into court. The assize courts are assisted by a jury chosen by the mayor and justice of the peace in each district from citizens over thirty years of age. The Gov. is represented by the public prosecutor. Appeal is allowed from the tribunals to the Court of Cassation. Convicts condemned to hard labour are transported to the penal settlements in New Caledonia and Fr. Guiana.

French Possessions.—F. possesses the second largest colonial empire. Under the Third Republic this has been seriously developed, and F. regards the inhabitants of the colonies as Fr. citizens and receives from them military and economic assistance. Algeria (*q.v.*) is divided into three Departments and governed as part of F., Morocco and Tunisia are under the Minister of Foreign Affairs, and the other possessions are directed by the Minister of Colonies. By the Treaty of Versailles (1919) F. received under mandate part of the former Ger. colonies of Togoland and Cameroon, also the mandate of the former Turkish territory of Syria (*q.v.*) (60,000 sq. m.; pop. 3,000,000). The Asiatic colonies consist of Fr. India (Pondicherry, Chandernagore, Karikal, Yanam, and Mahé; 200 sq. m., pop. 277,700), and Indo-China (Cochin China, Annam, Cambodia, Tonkin, and Laos; 310,000 sq. m., pop. 16,600,000). Africa contains the principal Fr. colonies, including Algeria (222,180 sq. m., pop. 5,992,770), Morocco (Protectorate) (223,000 sq. m., pop. 4,229,146), Tunisia (50,000 sq. m., pop. 2,159,758). Fr. W. Africa,

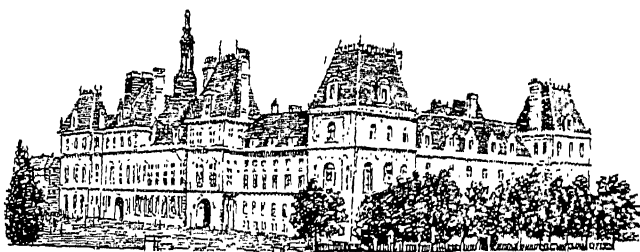
including Senegal, Fr. Guinea, Ivory Coast, Dahomey (incorporating Togo), Fr. Sudan, Upper Volta, Mauritania, Niger, (total area 1,844,400 sq. m., pop. 13,541,611), Sahara (1,544,000 sq. m., pop. 800,000), Fr. Equatorial Africa, including Gabon, Middle Congo, Ubanghi-Shari-Chad (total area 982,049 sq. m.; pop. 3,127,707), Cameroon (166,489 sq. m., pop. 1,500,000), Fr. Somaliland (5790 sq. m., pop. 208,000), Madagascar (228,707 sq. m., pop. 3,598,728), Réunion (970 sq. m., pop. 172,190), Comores (790 sq. m., pop. 110,000). In America the principal colonies are St. Pierre and Miquelon in Newfoundland, important on account of the adjoining fisheries, Martinique and Guadeloupe, and Fr. Guiana. The area of Fr. America is 33,166 sq. m. and the pop. 522,398. In Australasia F. possesses New Caledonia and the Society Islands, with total area of 9170 sq. m. and pop. 79,160. The total area of all the colonies is 5,637,804 sq. m., and the total pop. is 59,549,796.

Army and Navy.—The Fr. active army consists of 'metropolitan' troops and 'colonial' troops and a *force mobile*. The latter was created in 1927, being a select body whose duty it is to resist sudden foreign attack. The metropolitan troops serve in F. and N. Africa, and the colonial troops in colonies outside N. Africa. The metropolitan army is recruited partly by conscription, but the three-year service, instituted in 1913, was reduced to eighteen months in 1923 and to one year in 1928. The peace strength of the active army is about 590,000, of which the metropolitan army numbers 317,000 (estimated war strength about 1,300,000). The colonial army numbers about 49,000 white troops, with some 10,000 in the Foreign Legion, while there are 90,000 native N. Africans and 85,000 native colonials. During the Great War, 1914-18, nearly 10 million men passed into mobilisation. The Fr. air force is the largest in the world, numbering 1350 planes, with a personnel of 62,000 (excluding the naval defence service). The size of the Fr. navy in relation to that of other Powers has been the subject of the naval conferences since the War. By the Naval Pact of 1931, which supplements the Washington Conference limitation of capital ships and the London Naval Conference, the tonnage of the Fr. navy was agreed at the following figures: capital ships, 46,666 (parity with Italy); air-craft carriers, 56,146; cruisers with guns of more than 6-1, 70,000 (parity with Italy);

cruisers with guns of 6.1 or less, and destroyers 198,233; and submarines 81,989.

Finance.—F. favours indirect rather than direct taxation, i.e. on commodities rather than on persons. Before 1914 the old direct tax system, the *Quatres vieilles Contributions*, was in operation—taxes on real estate, on doors and windows, on business, and on presumptive income. Only the first exists to-day, and only in a modified form. In 1907 Caillaux, Finance Minister in the Clemenceau Cabinet, proposed the suppression of the old taxes and the creation of a new income tax. Fiscal reform was still under discussion on the declaration of war, which found F. financially unprepared. By 1914 the public debt had grown to 33 milliards, and

billion francs. During the occupation of the Ruhr the value of the franc declined, and the Morgan Bank of New York put at the disposal of F. 100 million dollars' worth of credits. In Jan. 1924, however, the eighth loan of the Crédit National failed to meet with any response, and a fortnight later de Lasteyrie, Minister of Finance in the Poincaré Cabinet, proposed a double décime—a two-tenths all-round increase of taxes. On March 22, 1924, an Act was passed allowing this on most taxes and also prescribing drastic economy cuts. Poincaré was defeated on his financial policy in the May elections, 1924. The franc was then at sixty-seven to the pound sterling; by July 1926 it was at 250 to the pound. On July 23 Poincaré was again called upon to form a



THE HÔTEL DE VILLE, PARIS

was to become 300 milliards by 1926. Half the public debt was floating or short-term debt, but whereas before the war the service of the debt took about 1 milliard francs (20 per cent. of the Budget), after the war it amounted to 18 milliards out of a State expenditure of some 40 milliards, while civil and military pensions accounted for 5 milliards. During the war F. lived on borrowing, and a war profits tax, instituted in 1916, failed to compensate for the expenditure. The pre-war income tax scheme was not applied until 1917. Immediately after the Armistice Fr. financial policy was based on the assumption that Ger. could pay a sum estimated at the huge figure of 400 milliard gold marks. By the Act of June 1920 the tax system was revised and the business turnover tax introduced together with higher rates of income tax. After 1921 F. entered on a period of inflation in order to meet the cost of reconstruction, and the policy of borrowing continued until, in 1923, the net borrowings amounted to nearly 16

ministry of Nations Union, and by Sept. the franc was stabilised at about 160 to the pound and thirty-three to the dollar. A Bill was put through the Chamber providing for 100 milliards of fresh taxation, and an independent sinking fund was established. The Fr. foreign debt is divided into the political and the commercial debt. The former amounts to over 18½ milliard gold francs at the old parity to the U.S.A. and to over 15½ milliard gold francs to Great Britain. The commercial debt to the U.S.A., England, Japan, Holland, Argentina, etc., is about 5 milliard gold francs. In April 1926 the Mellon-Borénger Agreement was reached with the U.S.A., whereby F. agreed to pay 6,850,000,000 dollars in principal and interest in 62 years, and by the Churchill-Caillaux Agreement with England, July 1926, F. agreed to pay in 1926 £4,000,000; in 1927 £6,000,000; in 1928 £8,000,000; in 1929 £10,000,000; and from 1930 to 1956 £12,500,000 annually; and from 1957 to 1988 £14,000,000 annually. On July 24, 1928, the

Stabilisation Law was passed, fixing the franc at a fifth of its normal value, i.e. at 65.5 mg. of gold instead of 322.6 mg. At the end of 1928, the internal debt amounted to 288,655,676,389 francs and the total foreign debt in dollars to 14,766,000,000 (U.S.A., Political Debt: 2,912,000,000 dollars; U.S.A. Commercial: 673,000,000 dollars; Great Britain, Political Debt: £710,000,000; Great Britain Commercial; £1,000,000).

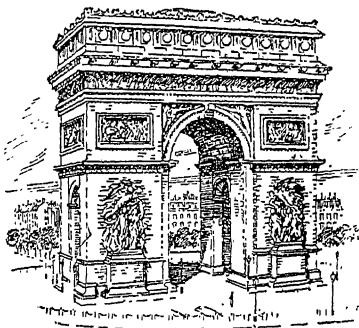
See H. G. Moulton and C. Lewis, *The French Debt Problem*, 1925; R. M. Haig, *The Public Finances of Post-War France*, 1929 (Columbia University Press).

Education.—The beginning of the present century saw the final triumph of the State in its long struggle with the Church for the control of education in F. Previous to 1880 the Church controlled its own primary and secondary education and had the power of granting university degrees. The law of 1880 made primary education under State control free and compulsory and took away the special privileges of the Church. Religious teaching was abolished in the schools at the same time. In 1904 teaching by religious bodies was forbidden and religious schools were closed. For educational purposes F. is divided into seventeen districts, under the control of rectors who are responsible for all forms of education within their district. Each district has a council. Primary education is compulsory between the ages of six and thirteen, and is given in some 85,000 schools with 160,000 teachers. Secondary education is given in the various lycées and colleges, both communal and private. Higher education is given in the universities of Paris, Lyons, Toulouse, Bordeaux, Lille, Nancy, Nantes, Grenoble, and Montpellier, which are almost entirely free.

Religion.—The principal religion is the Rom. Catholic, which was recognised by the State until Dec. 1905 as the national religion. Before that date the State had paid for the Rom. Catholic, the Protestant, and the Jewish religions, in proportion to their respective numbers, but afterwards it paid no salaries, nor subsidised religions in any way. Marriage made by the Church is not recognised by the State, which requires the ceremony to be performed before a public functionary. On the contrary, the Rom. Catholic Church does not recognise State marriage. There are seventeen Rom. Catholic archbishops, and sixty-seven bishops. The Protestants number some 600,000, the majority being Calvinists, and there are about 70,000 Jews.

Law.—The laws of France were

codified at the beginning of the eighteenth century at the instigation of Napoleon Bonaparte, and are still in force with but few amendments. (See CODE NAPOLEON.) The administration of justice in France is organised under four systems, known as *Jurisdiction Civile*, *Jurisdiction Commerciale*, *Jurisdiction Administrative*, and *Jurisdiction Correctionnelle et Criminelle*. Within the first system come all civil cases between individuals, and these are adjudicated upon by the Civil Tribunals. All commercial suits within the usual category are judged by the Tribunals of Commerce, which adjudicate also



THE ARC DE TRIOMPHE, PARIS

upon cases of bankruptcy, there being no separate bankruptcy courts. The third system, *Jurisdiction Administrative*, comprises all actions against the Gov., these being submitted to the *Tribunaux Administratifs*. The fourth system, *Jurisdiction Correctionnelle et Criminelle*, covers all application of the penal law—by the *Tribunaux Correctionnels* for the repression of misdemeanours and by the Courts of Assize for criminal cases. The jury system is adopted in these latter only. Civil cases in which a sum of not more than 200 francs is in dispute are tried before a Justice of the Peace (*Juge de Paix*), one being appointed to each canton. Civil cases outside the jurisdiction of the *juge de paix* are tried in the first instance before Civil Tribunals of First Instance, which exist in every *sous-préfecture*. The *Tribunal Civil* may also adjudicate in commercial cases where a separate Tribunal of Commerce does not exist. Appeal against the decisions of Civil and Commercial Tribunals is made to one of the Courts of Appeal of which there are twenty-five. The special juris-

diction over commercial cases is administered only in those districts where a Tribunal of Commerce has been established by the Gov. F. L. does not allow any act of the Administration to be submitted to the ordinary courts. Special tribunals, called *Conseils de Préfecture*, exist in every Préfecture to adjudicate in all cases between individuals and Gov. agents. Appeals against the decisions of these tribunals are made by the *Conseil d'Etat* in Paris. Appeal against the decisions of the Correctional Tribunals and the Courts of Assize can be made only to the Court of Cassation, which exists to ensure the proper application of F. L. It has authority over all the tribunals of France, civil, commercial, administrative and criminal. (There is a special system of law for and special tribunals for the adjudication of questions in which the State or its officials are concerned. See DROIT ADMINISTRATIF.)

Language.—The Fr. language is one of the Romance tongues. It is not a direct outcome of classical Latin, but of the *lingua romana rustica*, the common language spoken by the Rom. legionaries and merchants. The original Celtic tongue of the inhabitants of Gaul died away except in Brittany, leaving extremely few traces. It survives in a few words such as *alouette*, *sac*, *lieue*, *braie*, and influenced the form of some words of Latin origin. The Franks who invaded Gaul during the fifth century had more effect upon the language, and many words are of Frankish origin, as *guerre*, *fief*, *bière*. The *lingua romana* took different forms in F. according to the races and environment. Two main divisions are easily made, in the S. the *langue d'oc*, and in the N. the *langue d'oïl*, so called from the words used to denote affirmation. The line of division would run approximately from La Rochelle to Grenoble, through Limoges, Clermont-Ferrand, and Lyons. Formerly it was customary to regard the *langue d'oc* as part of the Fr. language, but it is now held to be a distinct branch of the Romance group. Both languages were further subdivided into numerous dialects and patois. The principal dialects of the *langue d'oc* were provençal, languedocien, dauphinois, auvergnat, and limousin, those of the *langue d'oïl* picard, burgundian, norman, poitevin, and especially that of the Ile de France, which eventually became the main tongue. Its triumph was mainly due to the accession of Hugh Capet, Duke of F. and of Orleans, to the throne in 987, thereby making Paris the capital of the kingdom. Even in Rome itself

in classical times there were two sorts of languages. There were the Latin of Cicero and Cæsar, taught and spoken by the educated, and the language of the middle and lower classes. The difference lay chiefly in the pronunciation and syntax. The tendency manifested itself to slur over and drop the unaccented syllables. Hence even in classical authors we find *sæclum*, *vinculum*, instead of *sæculum*, *vinculum*. This tendency also affected the syntax by obscuring grammatical endings, and led to the introduction of independent particles to denote grammatical relation, such as prepositions and auxiliary verbs. In Gaul classical Latin was still learnt in the schools and affected by the higher classes, but the invasions of barbarians in the fifth century destroyed the culture of the country, and gave freer play to the colloquial tongue. The tendencies already remarked above were intensified. The kernel of each word was the accented syllable, which persisted, while the unaccented ones underwent modification or disappeared altogether. Vowels immediately preceding the accented syllable disappeared if short, but were preserved if long, as *claritatem*, *clarté*; *pergrinum*, *pèlerin*. Vowels following the accented syllable disappeared, or were reduced to *e* mute, as *mortalem*, *mortel*; *tabulum*, *table*. A medial consonant separating two vowels of which the second is accented also disappeared, or was modified, as *dolère*, *douer*; *debere*, *devoir*. Words from the Latin not following these rules are of learned origin imported at later date. The simplification of Latin case-endings soon led in *lingua romana* to the reduction of the six cases to two for masculine nouns, the nominative and accusative, and to the accusative only for feminine nouns. Thus *rosam* and *rosas* for the feminine forms in Gaulish Latin for both nominative and accusative in the singular and plural respectively and gave the modern forms *rose* and *roses*. The masculine *murus*, *murum* (singular), and *muri*, *muros* (plural) gave:

	<i>Sing.</i>	<i>Plur.</i>
<i>Nom.</i>	<i>murs</i>	<i>murs</i>
<i>Acc.</i>	<i>mur</i>	<i>murs</i>

The nominative disappeared from use in the fourteenth century, leaving only the accusative form *mur* and *murs*. Traces of the nominative still remain, however, in *on*, besides *homme* from *homo*, *sire*, besides *seigneur* from *senior*, and in proper names *Jacques*, *Georges*, etc.

Literature.—As already stated, the Fr. language arose from the *lingua romana rustica*, the popular form of

Latin spread through S. Europe by Rom. soldiers, merchants, and colonists. In course of time the pure Latin language became no longer recognisable by the speakers of the *lingua romana*, and various glossaries were compiled for the aid of those who wanted to read Latin texts. Such glossaries afford the earliest monuments of the Fr. language. The glossary of Reichenau belongs to the end of the eighth century, and contains the Latin words of the Vulgate with their Romance equivalents. Another glossary, that of Cassel, contains some old Ger. words with Romance equivalents. The earliest consecutive monument of the Fr. language is the oath of Strasbourg, made in March 842. The empire founded by Charlemagne was divided by his three grandsons, and two of them, Charles the Bald and Louis the German, swore to aid each other against their elder brother Lothair. Louis the German uttered his oath in the Romance tongue in order to be understood by Charles's soldiers, and the form was as follows: 'Pro Deo amur, et pro Christian poblo et nostro commun salvament, d'ist di in avant, in quant Deus savir et podir me dunat, si salvarai eo cist meon fradre Karle, et in adjudha et in cadhuna cosa, si cum om per dreit son fradra salvar dift, in o quid il mi altresi fazet, et ab Ludher nul plaid nunquam prindrai qui, meon vol, cist meon fradre Karle in damno sit.' The Eng. translation is: 'For the love of God and for the common safety of ourselves and the Christian people, from this day forward, as far as God gives me wit and power, I will defend my brother Charles both by help and by every means, as one should by rights defend his brother, on condition that he do the same for me, and I will make no pact with Lothair, which, by my will, may be disadvantageous to my brother Charles.'

The literature of the tenth and eleventh centuries consists of the *Cantilène de Ste. Eulalie* and the *Vie de St. Leger* in assonanced verses. The latter poem also exists in versions reworked during the twelfth, thirteenth, and fourteenth centuries, and so enables the student to follow the course of the language. The first great achievement of Fr. literature was the production of the *chansons de geste*. These are epic poems narrating the exploits of the heroes of the Frankish nations and celebrating chiefly the deeds of Charles Martel and his grandson Charlemagne. They originated with the Merovingians and were carried by minstrels from castle to castle. In the beginning they were

assonanced, but from the thirteenth century they were rhymed. The most famous of all the *chansons de geste* is the *Chanson de Roland*, the earliest text of which is found in the MS. of Oxford (1080), but we know that it was sung at the Battle of Hastings (1066). All these *chansons* were gradually compiled by the addition of the work of one minstrel to that of his predecessors, so that they can hardly be said to have any original form. The *Chanson de Roland* is an historical poem which takes upon itself a legendary character. Charlemagne was returning from an expedition against the Saracens in the N. of Spain when his rearguard, under the Count of the Breton Marches, was, owing to the treachery of Ganelon, surprised and overwhelmed by the enemy in the valley of Roncevaux, and with Roland perished Olivier, Turpin, and other Fr. nobles. The story is very vividly told. Olivier, seeing the army surrounded by the foe, advises Roland to sound his ivory horn in order to recall Charlemagne, but three times Roland refuses. The Fr. succumb before the mass of foes until only Roland, Olivier, and Turpin are left. Then Roland sounds his horn and Charlemagne returns to aid him. Olivier and Turpin both perish, and Roland, seeing no hope of escape, tries in vain to break his good sword Durandal against the rock, but cannot, and dies with his face towards the land of the enemy. There is a vividness of action and a strength in the delineation of character that give the poem the imprint of a masterpiece. The *Chanson de Roland* forms one of the cycle known as the *Geste de Charlemagne*, while other poems are grouped together into the *Geste de Guillaume d'Orange* and the *Geste de Doon de Mayence*. One of the best poems of the period is *Raoul de Cambrai*, which depicts the feudal conception of fidelity. Bernier, Raoul's squire, sees his mother and his uncle Ernaud murdered by his liege lord without being able to renounce his allegiance, and only when Raoul ruthlessly pursues one by one all the partisans of Ernaud does Bernier decide to draw his sword and slay his master.

The *chanson de geste* gave place to the romances, which are distinguished from them by being the narration of exploits of fictitious heroes, while the former had always a certain amount of historical background. The material for the romances was taken from the Celtic bards of Brittany, who sang the exploits of Arthur, the last of the British kings, and his celebrated Round Table. To

this theme were added the story of the quest of the Holy Grail and the unhappy love story of Tristan and Yseult. The romances were developed from short lays translated directly from the Bretons. The greatest writer of such romances was Chrétien de Troyes (d. 1195), who wrote *Tristan*, *Erec*, *Cligès*, *Lancelot* or *The Chevalier à la Charrette*, *Yvain* or *The Chevalier au Lion*, *Perceval*. These poems are imbued with that feeling of chivalry and mysticism which has given such a glamour to the knightly period, and were copied and imitated throughout Europe. The romantic poems received a new development in the hands of the learned troubadours, who wished to display their learning by recounting the deeds narrated in the old Latin historians. Their chief production is the *Roman d'Alexandre*, a poem of 20,000 lines of twelve syllables, which have ever since been known as 'Alexandrines.' Others of the same school are the *Roman de Troie* in octosyllables (30,000 lines), *Roman d'Enéas*, *Roman de Thèbes*. As the simplicity of the *chanson de geste* yielded to the crudition of the later romances, so these in turn gave place to the elaboration of the allegory. The allegory is a form of didactic poem which presents abstract qualities as living personages. The most celebrated allegory of the period is the *Roman de la Rose*, of which the first part was written by Guillaume de Lorris about 1230. It represents in simple, elegant, and vigorous language the feelings of a dissident lover in courting his beloved. The second part is much longer, and entirely different in its inspiration. The author, Jean de Meung, simply uses the framework left by his predecessor as a vehicle upon which to depict his witty and satirical sketches of the society of his time. The range of subjects dealt with is encyclopaedic, and the influence of the poem was enormous.

One of the most characteristic forms of Fr. literature is the *fabliau*, which came into great favour in the thirteenth century. The *fabliau* is a short simple story in verse, full of pregnant reflections upon society, of wit, satire, and a certain pungent coarseness. Such poems are important as being a manifestation of the *esprit gaulois*, a term used to denote that quality of levity, railery, satire, and gaiety which is to be found in the whole realm of Fr. literature. The *fabliaux* were preceded by collections of fables which bore the name of *ysopet*, from the celebrated Æsop. The best known of the fables was the *Roman de Renard*, a kind of humorous epic

poem dating from the twelfth century, in which the animals are endowed with human characteristics, and the fox's cunning enables him to triumph repeatedly over his less sagacious rivals. The *Roman de Renard* has retained its appeal throughout the centuries, and was rehandled by Goethe. Of the *fabliaux* the principal are *Le Vilain Mire* (The Peasant Doctor), *Estula*, *Les Perdriz*. They are extremely varied, full of local incident and colour and of great utility in forming an idea of the state of social life of the period. The most celebrated writer of *fabliaux* was the poet Rutebeuf (d. c. 1280), who wrote many mordant satires against women, mendicant friars, the university, and other subjects. He is, moreover, worthy of note as being the first Fr. poet to introduce a deep personal tone into his poetry.

The lyrical poetry of mediæval Fr. literature was an outcome of the popular song. It was to a great degree imitated from the S. nations, the Italians, and the Spaniards, and from the troubadours of the *langue d'oc*, the form of language spoken in the S. part of France. From these sources the *trouvères* of the thirteenth, fourteenth, and fifteenth centuries drew their inspiration. Lyric poetry developed upon two lines; as regards subject it sounded in an increasing degree the personal note, as regards form it became enslaved more and more to certain fixed forms (ballad, rondeau, chant royal, etc.). It is not until the fifteenth century that lyric poets of enduring reputation are found. Among them must be mentioned Alain Chartier (1386-1440), called *La père de l'éloquence française*; Charles, Duke of Orleans (1391-1465), whose poems are full of grave elegance and melancholy; and finally François Villon (1431-80), who gave expression to a depth of feeling and personal emotion to a degree not previously met with. His *Petit Testament* and *Grand Testament* relate the excesses of his life, and his *Ballade des Dames du Temps jadis*, with its refrain *Mais ou sont les Neiges d'Antan?* ranks as one of the finest examples of lyrical poetry.

Turning to historical writings, we find the earliest works to have been written in Latin. Afterwards history was written in the form of verse such as *L'Histoire des Angles*, and two poems by Wace, viz. *Brut* (the history of the Bretons), and *Row* (history of the Normans). The first important prose history is the *Conquête de Constantinople* by Villehardouin (1207), which is a narrative of the events of the fourth crusade, written to some

extent to vindicate the author for having been a party to turning the army of the crusaders from their real goal towards a more lucrative object, but it gives a terse, clear account of events and a record of the conflicting counsels of the leaders. A hundred years after Villehardouin, Jean de Joinville, at the request of Jeanne de Navarre, wife of Philip le Bel, wrote his account of the sixth crusade, which affords a detailed and simple account of the doings of St. Louis IX., whose human and saintly qualities are described with such a lack of affectation that the book is one of the most sincere documents of the past. Froissart is a good deal less mediæval in tone than Joinville. His *Chroniques*, written towards the end of the fourteenth century, deal with the events in England, France, and Flanders between 1325 and 1378. Froissart astonishes us by his wealth of detail and his care to gather all possible information upon the events described. Philippe de Commines was the historian of the affairs of Louis XI., of Charles the Bold, Duke of Burgundy, and of the expeditions to Italy under Charles VIII. His work takes us up to the year 1498. He is more than an historian, he is a politician and a thinker. In Louis XI. he had to portray a king who won his way more by diplomacy than by force of arms, and he succeeds in giving an accurate delineation of the characters of the various historical personages.

The drama of the Middle Ages took its rise from the Church ceremonies. The liturgy was developed by interpolation of Latin verses and canticles, and afterwards by pieces recited by various persons, which finally became amplified into the liturgical dramas such as *Les Pasteurs*, *Les Vierges sages et les Vierges folles*. Here the Latin tongue gradually gave way to the native language, and as the scope of the pieces increased they were removed from the choir to the porch of the church. The *Drame d'Adam* (twelfth century) was the first piece played outside the church. In the thirteenth and fourteenth centuries were represented the Miracles, dramatic accounts of the intervention of the Virgin in human affairs. One of the best known miracle plays of the thirteenth century is the *Miracle de Théophile* by Rutebeuf, while in the next century occur *Les Miracles de Notre Dame*. The fifteenth century saw the rise of the mystery (from Latin *ministerium*, service), a term used to denote pieces drawn from the O. and N. Ts. and from the lives of the saints. Such mysteries are of extreme length,

running into 30,000, 40,000, or even 60,000 lines. They required several days for their presentation, and the number of persons taking part often exceeded 100. Associations were soon formed for their production, and brought about a higher degree of dramatic skill than the miracles had done. The mysteries can be divided into four cycles: (1) the cycle of the O.T.; (2) the cycle of the N.T.; (3) the cycle of the saints; (4) profane mysteries. Among the last are *Le Mystère de Troie* (1463), and *Mystère du Siège d'Orléans*. The representation of mysteries was



RONSARD (1524-85)

prohibited by the Parliament of Paris in 1548 on account of their increasing profanity, but they lingered on elsewhere until the end of the sixteenth century.

The rise of Fr. comedy is very obscure. It appears to have developed from the *dits*, *monologues*, and *débats* that the wandering minstrels carried from castle to castle and from town to town. The first comedy is the *Jeu de la Feuillée* by Adam de la Halle, played in 1262 in Arras, while another, *Robin et Marion*, by the same author, a pastoral play with a musical accompaniment, was played in Naples in 1285. In the fifteenth century many societies were created for the presentation of farces, pantomimes, moralities, and *soties*, such as *Les Clercs de la Basoche*, *Les Enfants sans souci*, in Paris. Of the farces the most celebrated is *L'Avocat Pathelin*.

(1470), of unknown authorship, which was modernised in 1872 and is still rendered upon the stage. Mention must also be made of the moralities, allegorical and didactic dramas which were produced until the middle of the sixteenth century.

The sixteenth century ushered in the Renaissance of Fr. literature, the chief causes of which were the discovery of printing (1450), the Italian wars (1494-1515), which brought F. into contact with a more cultured people, and the humanistic movement, which led to the study of the anc. classical authors, and the Reformation, marked by Luther's rupture with the Catholic Church in 1521. The only great poet of the early part of the sixteenth century is Clément Marot (1497-1544), a courtier who produced some very elegant pieces and some *épîtres* which are of deeper inspiration. He also translated thirty of the psalms with considerable success.

In 1549 appeared Joachim du Bellay's *Défense et Illustration de la Langue française*, which set out the tenets of the new reforming party of Fr. poets. These poets grouped themselves round Ronsard, and were known as the Pléiade. Besides Ronsard and Du Bellay, they included Baif, Jodelle, Belleau, Pontus de Thyard, and Daurat. They endeavoured to give Fr. a worthy literary language by imitating from the classics, by coining new words, and by borrowing from the various dialects. Unfortunately, the less known poets and their imitators carried these ideas too far and brought ridicule upon the school, which led to the eclipse of the fame of Ronsard. Ronsard during his life was, however, regarded as the greatest of Fr. poets, and his sonnets are of considerable merit. Later he turned his attention to the epic, and produced *Franciade* (1572), in decasyllabic verse, which proved a complete failure. Du Bellay lacked the variety and force of Ronsard, but was more sincere in his verse. His best poems are contained in *Regrets*, *Antiquités de Rome*, and *Jeux rustiques*. Belleau wrote pastorals in his *Bergeries*, and Du Bartas, a disciple of the Pléiade, a pretentious work, *La Semaine*, depicting with vivid description and in a vigorous style the creation of the world, according to the biblical tradition. Agrippa d'Aubigné (1550-1630), another disciple of the Pléiade, and a doughty champion of Protestantism, wrote *Les Tragiques* (1616), a succession of descriptive tableaux dealing with the misery and corruption of the world and with the final judgment.

François Rabelais (1483-1553) is, like Jean Jacques Rousseau in the eighteenth century, a writer of whom it is difficult to appraise the exact merit. Born at Chinon, he was first a monk and then a doctor. He led a very unsettled existence, residing at Lyons, Rome, Metz, and elsewhere. His works are *Gargantua and Pantagruel*, giants whose actions serve, as in Swift's works, to portray the author's conceptions of humanity. Rabelais' writings reflect the struggle of the Renaissance against the cramping influence of the Church, and their improbability and disproportion are but a cloak to cover his attacks. His characters are simple and unrestrained. His doctrine may be summed up as advocating the development of both mind and body, and his rule of conduct was *Fay ce que voudras*. He is remarkable for his intense power and for the wealth of neologisms and latinisms with which his pages teem. His work is a curious medley of shrewd observation and unrestrained obscenity. At the same time as Rabelais lived Margaret of Valois, Queen of Navarre, who was the protector of the poets and thinkers of her age. Her well-known work, *Héptameron*, appeared in 1558 after her death. It is imitated from Boccaccio's *Decamerone*, and, though it strikes us as extremely free, was rather restrained for the age in which it was written.

The Renaissance led naturally to the translation of the ancients. Amongst other works of this period Amyot's translation of Plutarch (1559) is specially worthy of mention, serving as it did both to enlarge the field of view of Fr. literature and to enrich the vocabulary of the language. Henri Estienne furthered the knowledge of Gk. and at the same time defended the language against the influx of Italian words. Montaigne (1533-92) is known to all by his *Essais*, and was undoubtedly the first prose writer of his century. The *Essais* offer an inexhaustible wealth of information upon all the varied customs and usages of mankind. To the fierce dogmatism of religion he opposed the scepticism based upon the conflicting history of the human species. Without prejudice he states his observations and arrives at his characteristic maxim, *Que sais-je?* His style is simple, unaffected, and spontaneous, and he will probably always retain his rank as one of the world's foremost essayists.

The theatre during the sixteenth century did not show any strong individuality. It consists almost entirely of translations from Gk., Latin, and Italian sources. In 1552

Jodelle produced *Cléopâtre*, the first original tragedy in Fr. Larivey wrote some dozen comedies adapted from the Italian but quite Fr. in spirit, and may be regarded to some extent as the forerunner of Molière. Among the historians of the period, mention should be made of Brantôme (1540-1614), whose *Mémoires* contain 'Vies des hommes illustres et des grands capitaines' and 'Vies des dames illustres.' He wrote with vigour, wit, and cynicism. Blaise de Montluc (1502-77), one of the foremost soldiers of his time and notorious for the cruelty he showed in the wars of religion, wrote his *Commentaires*, giving an account of his campaigns from 1519 to 1574. D'Aubigné, mentioned above, wrote *L'Histoire universelle*, really a Fr. history from the Protestant standpoint from 1550 to 1601. Among the works of religious nature, foremost is Calvin's *Institution chrétienne* (1541), the Fr. version of his Latin work of the same title. It is important as being the first religious work written in the Fr. language. François de Sales' *Introduction de la Vie dévote* (1608) also belongs to the sixteenth century by its style. *La Satyre Menippée* (1594), a pamphlet written in collaboration by several persons, is well known, and was greatly instrumental in reconciling the conflicting religious parties.

During the seventeenth century Fr. literature reached its zenith. The progress was not, however, greatly marked in the realm of poetry, which was content simply to liberate itself from the excesses of Ronsard's followers. The outstanding figure is Malherbe (1555-1628), at first a disciple of Ronsard, but afterwards a strict opponent of all exaggeration. He insisted upon the use of words of undoubted Fr. nationality, and reduced his verse to the severest models, thereby founding the classical school. He regularised the Alexandrines, held the caesura as essential, prescribed *enjambement* and hiatus, and advocated richness of rhyme. Unfortunately, he succeeded at the same time in banishing all lofty inspiration from Fr. poetry and left it formal and lifeless. His immediate disciples were Racan and Maynard, but he found many adversaries among the followers of Ronsard, e.g. Vanquelin de la Fresnaye, Desportes, Bertant, Mathurin de Régnier. The latter accuses Malherbe of being *faible d'invention, froid à l'imaginer*, a mere *regrettier de syllabes*. Be that as it may, Malherbe's influence grew until he was finally regarded, owing to Boileau's appreciation, as the founder of modern Fr. poetry.

The classical movement was helped by several causes. In 1637 Descartes published his *Discours de la Méthode*, the first Fr. book upon a philosophical subject. Indirectly the work had a great effect upon Fr. literature. It gave to the prose a solidity it had never had before. Its theories seized hold of Fr. minds, and all the writers of the century were imbued with Cartesian tenets. Philosophy became the property of the ordinary man, after having been confined to the learned. From Descartes the great writers acquired a sense of truth and order, a regulation of their art that finds its greatest expression in the classical school. The unity of the language was further promoted



MONTAIGNE (1533-92)

by the establishment of the Fr. Academy, which arose out of a small reunion of literary persons who met at the house of Valentin Conrart and discoursed upon literary topics. Richelieu, with his zest for organisation, wished to give this reunion the prestige of an official assembly, and in 1634 the statutes of the Academy were drawn up. One of them required that the Academy should prepare a dictionary, work upon which was at first undertaken with zeal, but afterwards abated, the dictionary appearing in 1694, followed by later editions in 1718, 1740, 1762, 1798, 1835, and 1878. Another influence upon Fr. literature in the seventeenth century was the famous *salons*, principal among which was the Hôtel de

Rambouillet, where the men of letters used to meet with persons of rank and breeding. The result was a refinement of language, the rejection of all coarseness of expression, a striving after elegance, which subsequently degenerated into affectation or *préciosité*. Among the frequenters of the Hôtel de Rambouillet were Malherbe, Racan, Vaugelas, Voiture, Cornille, Bossuet, and other well-known literary men. Vaugelas occupied himself with great zeal in the study of the language, and produced in 1647 his *Remarques sur la Langue française*. One of the greatest prose writers of the period was J. L. de Balzac (1594-1654), whose letters had a wide popularity and were regarded as models. He was named *le grand épistolier*. His style is rich and vigorous, but somewhat heavy. He has been accused of being merely a maker of phrases, but his works abound in depth and beauty, and include excellent pages of philosophy, religion, and criticism. Voiture (1598-1648), also a letter-writer, was greatly admired in his day, and was for some twenty years the leading spirit of the Hôtel de Rambouillet. His style is laboured, but he writes upon a wide range of topics and shows a keen wit. He also wrote poetry of artificial character, his most celebrated piece being the sonnet on Urania, which vied with Benserade's sonnet upon Job, and led to the two factions of Uranistes and Jobelins in the Hôtel de Rambouillet.

Drama made greater progress during this century than poetry, and produced the three greatest dramatists of Fr. literature, Corneille, Racine, and Molière. The two former have to some extent lost a part of their glory, and their works have had no lasting effect upon European literature. Ger. dramatists, after following Fr. models for some time, finally devoted their homage to the Shakespearean drama, and it may be stated generally that the Shakespearean form has finally triumphed over the Fr. classical drama. Neither do Corneille and Racine compare on terms of equality with the Gr. dramatists whom they emulated and whose rules they strove to follow. On the other hand, the fame of Molière shows no diminution, and he is held to be the greatest of Fr. comedy-writers. His satires upon human weakness still retain their force and their appeal.

Before Corneille several types of plays rivalled each other for popular favour, principally the tragedy, the tragi-comedy, and the pastoral. The first dramatist of the century was Alexandre Hardy (1569-1630), a

writer of great fertility, who produced some 700 or 800 plays, of which forty have come down to us. Though not a great playwright, he nevertheless had a keen sense of dramatic effect, and knew how to marshal his scenes and to set off his characters. He shows greater freedom in choice of subjects and in range of action, in the number of characters and scenes, than do the classical writers, and might, with greater genius, have given a different turn to the drama. After Hardy came Mairet (1604-86), whose tragedy *Sophonisbe* is remarkable as being the first tragedy which strove to give effect to the unities of time, place, and action, which were to dominate the Fr. theatre for two centuries.

Pierre Corneille (1606-84), b. at Rouen, produced his first play, *Médée*, a comedy, in 1629. Its success induced him to write several other comedies. In 1635 he wrote his first tragedy, *Médée*. In the meantime he had moved to Paris, where he became one of the five authors of Cardinal Richelieu, who drew up the plan of a play and handed it over to these authors to put into suitable form. Corneille had, however, no power of ingratiating himself with the great, and was dismissed for lack of *esprit de suite*, or ability to conform with his patron's plans. In 1636 *Le Cid* was produced. Its success was immense, and surpassed that of all plays previously produced. Nevertheless it met with great criticism from several quarters, and Richelieu submitted the question to the newly-formed Academy, which uttered its opinion in the *Sentiments de l'Académie française sur le Cid*. In 1640 Corneille produced two plays, *Horace* and *Cinna*, and in 1643 *Polyeucte* and *Pompée*, as well as a very successful comedy, *Le Menteur*. Between 1642 and 1652 he wrote *Rodoigne*, *Théodore*, *Héraclius*, *Nicomède*, and *Pertharite*. The latter was a failure, and Corneille then ceased to write until 1659, when he produced *Œdipe* and several other pieces. In 1674 he wrote his last piece, *Suréna*, which was a failure. From *Le Cid* Corneille always conformed to the three unities of time, place, and action, not, however, without a certain show of restraint. He chooses his subjects from history, particularly dealing with such episodes as show the triumph of the will over the emotions. His characters show great firmness and heroism, and La Bruyère states that he portrayed men as they ought to be, not as they are. In giving the authority of history to his characters he made them appear more probable than they otherwise would have done. His style is oratorical, grave, and

effective. He is poor in imagery, but strong in argument, full of well-stated maxims and keen dialogues.

Corneille was ultimately overshadowed by Racine (1639-99), whose first piece, *La Thébaine, ou les Frères ennemis*, appeared in 1664, followed next year by *Alexandre*, both of them imitations of Corneille's art. In 1667 he produced *Andromaque*, which achieved a great success, and from that date to 1677 several other tragedies, *Britannicus*, *Bérénice*, *Bajazet*, *Mithridate*, *Iphigénie*, and *Phèdre*, as well as a comedy *Les Plaideurs*. All of these plays were successful. In 1677 he ceased to write for the theatre owing to religious scruples. In 1689 he wrote, at the instigation of Mme. de Maintenon, his tragedy *Esther* (which was produced by the young ladies of St. Cyr), and two years later, *Athalie*. Racine, like Corneille, adhered to the unities, but he succeeded in doing so without effort. He presents not the moral qualities but the emotions and passions of his characters. His drama is more human and congenial than that of Corneille, and did not fail to appeal to the public. His style is harmonious and natural. Apart from his plays, he wrote numerous lyrics, a *Histoire de Louis XIV.*, and an *Abrégé de l'histoire de Port-Royal*.

Fr. comedy before Molière was represented by *Le Menteur* of Corneille and works by Rotron and Scarron imitated from the Spanish and Italian. Jean Baptiste Poquelin, alias Molière (1622-73), founded with the Béjart family in 1643 *L'Illustre Théâtre*, but was forced by want of success to tour in the provinces from 1645 to 1658. In the latter year he came to Paris, where he produced *L'Etourdi*, which was very successful. In 1659 he produced *Les Précieuses ridicules*, which established his reputation, and then successively *L'Ecole de Maris*, *L'Ecole des Femmes*, *Tartufe*, *Don Juan*, *Misanthrope*, *Le Médecin malgré lui*, *Les Femmes savantes*, *Le Malade imaginaire*. He was seized with illness whilst playing in the four representations of the last-named piece, and died shortly afterwards. Molière was a great playwright, and his best comedies are among the greatest that have ever been written. He expresses very happily the Fr. national spirit. His greatest weapon is ridicule, his greatest aversion hypocrisy and affectation. *Les Précieuses ridicules* exposes the pedantry of the erudite Fr. women. *Tartufe* is a type of the religious hypocrite. In *L'Avare* he portrays the effects of miserliness. His characters are taken from life, and are of great variety and

interest. He is remorseless in his banter towards the failings and vices of humanity. He appealed from the pedants, the prudes, the *précieux*, the snobs to the Fr. people, and won his way to their hearts. He has been attacked for his want of style, but his defence is that his language is that of his characters.

Blaise Pascal (1623-62) was one of the foremost prose-writers of the seventeenth century, and in reading him we feel that we have at length arrived at modern Fr. prose. He was a member of Port-Royal, the Jansen-



MOLIÈRE (1622-73)

ist abbey, where the theological doctrine of grace was accepted as the true gospel. His first work, *Les Provinciales* (1656) is a series of letters against the Jesuits, and entirely shattered the prestige of that order. After his death were published his *Pensées*, the fragment of an *Apologie de la Religion*. He closely follows on Montaigne in observing the variety and uncertainty of human endeavour, but concludes that the sole refuge for thinking persons is in an absolute faith in the divinity. Pascal shows deep penetration and draws pregnant conclusions from his observations, brings his mathematical and scientific mind to the aid of his religion, and tries to establish a proof of the Christian religion. There is little doubt that he was unbalanced and a prey to a morbid dread, but his works remain as a model of clear, nervous prose. The seventeenth century also marked the zenith of the sermon. The three great preachers are Bossuet, Bourdaloue, and Massillon. Bossuet (1625-1704) became Bishop of Meaux,

and was famous for his funeral orations, notable that on the Prince de Condé. He was a great religious controversialist, and wrote *L'Histoire des Variations des Eglises protestantes*, as well as combating the heresy of quietism, which Fénelon tried to defend. Another work from his pen is the *Discours sur l'histoire universelle*. Bourdaloue as a preacher was even more popular than Bossuet, while Massillon was also renowned for his harmony and elegance of style.

The increase of social intercourse called forth many works dealing with human manners and motives. Writers upon this subject are usually called moralists. The most celebrated moralist of the century was La Rochefoucauld, who published his *Mémoires* in 1662 and his *Maximes* in



BLAISE PASCAL (1623-62)

1665. In the latter he shows all human actions to be actuated by motives of self-interest and vanity. His style is exceedingly terse and antithetical. La Bruyère was less systematic than his predecessor, and his *Caractères* (1688) show deep penetration and a considerable tinge of misanthropy. In some of his passages he speaks out with surprising vigour on behalf of the oppressed, thereby heralding the eighteenth century.

Of the great number of letter-writers of this period it suffices to mention Mme. de Sévigné (1626-96), whose letters to her daughter, written in a sprightly and natural style, reveal to us not only her own emotions and sentiments, but the history of the period and the state of society and literature; and Mme. de Maintenon (1635-1719), wife of Louis XIV., whose letters deal with the education

of her young charges at St. Cyr. Memoir-writers are Mme. de Motteville, who gives a simple and sympathetic account of the career of Anne of Austria, Cardinal de Retz, the historian of the Fronde, and St. Simon. The last named (1675-1755), misanthropical and disappointed as a courtier, has left an account of the court of Louis XIV. which is remarkable for the malignity of the portraits of his enemies. As a historian he is prejudiced and unreliable, but his descriptions are extremely vivid and his style eloquent and vivacious. The novel of the seventeenth century was generally an affected tale of chivalrous adventure. Best remembered are Honoré d'Urfé's *L'Astrée* (1627), a pastoral romance, and Mlle. de Scudéry's *Le Grand Cyrus* (1648).

The most typical Frenchman of the period was La Fontaine (1621-95). He published a book of *Contes* in 1664, and in 1668 the first six books of *Fables*. Though written at the height of the classical period, these fables lack the restraint shown in the classical literature. La Fontaine is the most *gaulois* of all his countrymen. His fables are little comedies, written in sprightly polymorphic verses, narrating episodes between various animals and full of reflections upon human life. His descriptions are most happy and his incidents of great variety. His verse is often of lyric character. La Fontaine never preaches. The moral of the fables is so ingeniously conveyed that it at once strikes home. Probably no writer has added more catch-phrases to the stock of common Fr. speech than this admirable fabulist.

With Boileau (1637-1711) we arrive at the apostle of classicism. His work is mostly critical, and his rulings were accepted for more than a century. By his *Satires littéraires* he entirely discredited the inferior writers of his time, and eulogised Corneille, Racine, and Molière. His principal work, *L'Art poétique*, codifies the usage of the great writers, and holds it up as a model to be followed. He recognises no Fr. poet before Malherbe, and contributed largely to the light esteem in which Ronsard was held. He holds reason to be the guiding principle of real poetry. He recommends fidelity to nature—"Rien n'est beau que le vrai, le vrai seul est aimable"—and the imitation of the ancients as the best method of high poetical achievement. In this he was opposed by the modernists, who, led by Charles Perrault, maintained that the age of Louis XIV. had already eclipsed any one age of ancient classical literature. Both sides in the dispute showed lack of critical and historical judgment,

but the modernists, though seemingly worsted, gained the day, and classical influence gradually waned. Fénelon (1651-1715), Archbishop of Cambrai, is well-known as a prose writer. His *Education des Filles* (1689) gives excellent advice upon the upbringing of girls. His *Télémaque* (1699) is a didactic work, written for his refractory pupil, the Duke of Burgundy, and conveying the fruits of Gk. literature. His *Explication des Maximes des Saints*, advocating the doctrine of quietism, embroiled him with Bossuet and led to his disgrace.

In the eighteenth century Fr. literature freed itself from Court influence. Louis XIV. died in 1715, and after his death began the struggle against central authority that ended with the revolution. *Salons* became very powerful in forming public opinion. A change came over the Fr. mind. Religion was enfeebled by the controversies of the previous century and lost its hold. Abstract branches of knowledge, as metaphysics and morality, were abandoned for the study of social and political questions. Literature did not make great advance, the originality of the age being shown more in works on history, science, and sociology. The two connecting links between the old and new centuries are Fontenelle (1657-1757) and Bayle (1647-1706). The former became the populariser of scientific knowledge in his *Entretiens sur la Pluralité des Mondes* and his *Eloges des Savants*. The latter was the precursor of the encyclopædists. His *Dictionnaire* (1697) reopened all questions of traditions and creeds, and was a direct attack upon authority. Montesquieu (1689-1755) is the first great writer of the eighteenth century. His earliest work, *Lettres persanes* (1721), is a brilliant and piercing satire on Fr. society and institutions. His *Considérations sur les Causes de la Grandeur et de la Décadence des Romains* (1734) is a work of real philosophic insight. *De l'Esprit des Lois* (1748) is an objective study of the various systems of legislature, written in a lively, versatile style, not quite in keeping with the gravity of the subject. Montesquieu is at once an inquirer and a reformer.

Buffon (1707-88) wrote from 1749 till his death his *Histoire naturelle* and *Epoques de la Nature*. He had great descriptive powers, and was notable for his hypotheses, which anticipated later discoveries. His *Discours sur le Style* (1753) is an eloquent expression of his opinion upon literary style.

The great name of the century is undoubtedly Voltaire (1694-1778). Though his writings are not perhaps

now widely read, his influence lives on. He was accepted by the world as the greatest man of the age, and his reputation was universal. He turned his attention to many branches of literature and stands high in them all, but is top in none. In poetry he wrote *Henriade*, an epic, and epistles, satires, and odes. He is sometimes happy in his light verse. His historical works are *Charles XII.*, *La Siècle de Louis XIV.*, *Essai sur les Mœurs*. His plays are modelled on Racine and Corneille. The principal are *Œdipe*, *Brutus*, *Zaïre*, *Alzire*, and



VOLTAIRE (1694-1778)

Méropé. By making use of a wider range of characters, scenery, and action he extended the scope of the classical drama. He also wrote short novels and stories, *Candide*, *Zadig*, *L'Ingénu*, etc., which served as a vehicle for social and political satires. Moreover, he left some 10,000 letters addressed to kings, princes, noblemen, and literary persons, which afford the greatest information concerning this period. Though a deist, he was opposed to all falsity in religion, and attacked the Church with a bitterness, keenness, and banter which did it lasting harm. He fought throughout his whole life against both gov. and ecclesiastical oppression, and prepared the way for revolution.

The Encyclopædia appeared from 1751 to 1772. Commenced by D'Alembert it was taken up by Diderot, who obtained the collabora-

tion of distinguished writers, and showed surprising versatility in his own contributions. Though the gov. attempted to hinder the work, it was successfully published, and contributed to the defence of political and intellectual liberty.

The theatre made little progress during the eighteenth century. Crébillon (1675-1762) wrote plays of a vigorous character but full of horrors. Ducis is noted for his translations of Shakespeare. Voltaire's plays have been mentioned above. Comedy was more favoured than tragedy. The Molière tradition was successfully continued by Regnard, Dancourt, Dufresny, and Le Sage. The comedies of Marivaux (1688-1763) were of quite



J. J. ROUSSEAU (1712-78)

an original character, dealing with the delineation of hesitating and diffident love. His principal plays are *Les Surprises de l'Amour*, *Le Jeu de l'Amour et du Hasard*, *Le Legs*, *Les fausses Confidences*. His analysis of character is very delicate, and he excels in portraying woman. He has a keen appreciation of comic situations. In style he is subtle, delicate, and dramatic, and was imitated by successors whose 'marivaudage' developed into over-refinement and affectation. Beaumarchais (1732-99) is famous for two plays, *Le Barbier de Séville* (1775) and *Le Mariage de Figaro* (1784), which were great successes. They are full of taunts at the nobility, and caught the exact tone of Fr. feeling.

After Voltaire, the most influential writer of the century was Jean Jacques Rousseau, whose peculiarities at length developed into the mania of imaginary persecution. His first work, *Discours sur les Sciences et les Arts*, endeavoured to show that human degeneracy was due to civilisation. His *Discours sur l'Origine de l'Inégalité parmi les Hommes* is the first manifesto of communism. *La Nouvelle Héloïse* is a portrait of wifely chastity which had an instant success. *Le Contrat social* is again a plea for communism. *Emile*, written in favour of a more natural system of education, is perhaps his *chef-d'œuvre*. His *Confessions* is a remarkably open account of his life, including his weakness and faults, but is not entirely reliable. It certainly shows Rousseau in some places in anything but a creditable light. Rousseau's daring and original thoughts upon society and its comparison with *L'Etat naturel* directly influenced the Revolution. His style was mixed, sometimes heavy and dragging, sometimes rhetorical and declamatory, but he brought eloquence and effect once again into the language, after the sober reign of classicism. His splendid descriptions of nature and his outpourings of personal feeling are the first source of the flood of romanticism which was to rise in the following century. His chief literary disciple was Bernardine de St. Pierre, who wrote a charming book, *Paul et Virginie*, a touching story of boy and girl love, full of splendid pictures of nature.

The best novelists of the eighteenth century were Le Sage, Marivaux and l'Abbé Prévost. Le Sage wrote two works, *Le Diable boiteux* (1707), an imitation from the Spanish, and *Gil Blas* (1715-35), an original novel whose scene is in Spain, and tells the vicissitudes of a man of modest origin who reaches a high political position. It is long and complex, but highly varied, and leaves a sense of reality. Marivaux wrote the novels *La Vie de Marianne* and *Le Paysan parvenu*, of the same type as his comedies mentioned above. L'Abbé Prévost is the author of *Manon Lescaut* (1732), a passionate love romance. He also translated several English novels.

Turning to lyric poetry, we find it represented at the beginning of the century by Jean Baptiste Rousseau (1671-1741), who was held for some time to be the greatest Fr. lyrical poet. Ecouchard-Lebrun, nicknamed Pindar-Lebrun, wrote odes after the style of Pindar. His most celebrated poem is *Le Vengeur*. André Chénier (1762-94), an unfortunate victim of the Revolution, wrote elegies, bucolics

and idylls, which are modelled upon the Gk., and breathe the very odour of classical charm. His metrical innovations, although copied from his models, led him to be claimed as the founder of the romantic school, but he is more closely allied to the Parnassians.

In the nineteenth century several important movements manifested themselves in Fr. literature, the enduring properties of which cannot yet be accurately appraised. The first is the Romantic movement, which took place between 1815 and 1850. The underlying principle of romanticism is the expression of individuality. The personal note predominates. Authors utter their emotions, aspirations, beliefs, and ideals. They break down the arbitrary barriers of form created by the classical school, and prefer to seek their inspiration in the northern literatures than in the exhausted fields of Classical and Southern Europe.

First of the romanticists is Chateaubriand (1768-1848), whose works *Réné, Atala, Le Génie de Christianisme* abound in vivid, subjective, natural description, in religious feeling, and in melancholy. Mme. de Staël (1768-1817) brought Shakespeare into the ken of the Fr. nation by her work *La Littérature*, and turned Fr. thought into a new channel by *L'Allemagne*. Lamartine (1790-1869) was the first romanticist to develop the lyrical strain of poetry. His poems, with their deep religious feeling and acquiescence in the divine will, were well in keeping with the mood of a nation just recovering from the strain of Napoleonism, and the sense of crushing defeat. With true lyrical faculty he nevertheless errs on the side of prolixity and facility. Victor Hugo (1802-85) has greater claims to be held as the chief of the romanticists. Though his inspiration was not of the deepest, it was extremely varied, and he knew well how to embody it in form. He broke down the rigidity of the Alexandrine, and made it of surprising richness. He used every variety of metre, and revelled in an inexhaustible vocabulary. His chief collections of poems are *Odes et Ballades, Les Orientales, Les Feuilles d'Automne, Les Chants de Crépuscule, Les Voix intérieures, Les Contemplations, La Légende des Siècles*. Hugo's attempts to revolutionise the drama were not quite successful. *Cromwell, Marion Delorme, Hernani, Les Burgraves* have not the touch of greatness. The characterisation is bizarre and imperfect, the historical sense is unconvincing, but the poetical value is high. His novels *Notre Dame de*

Paris, Les Misérables, Travailleurs de la Mer are too crowded and exuberant, though of great descriptive power. Alfred de Vigny (1797-1863) is thoughtful and pessimistic in his poetry. He writes of the cruelty of nature and the indifference of God. His best poems are *La Colère de Samson, La Mort du Loup, La Bouteille à la Mer*.

Alfred de Musset (1810-57) has a great hold upon Fr. hearts. His poems tell of the regrets of love, and are inexpressibly tender and sad. Best among them are *Les Nuits*. His



VICTOR HUGO (1802-85)

dramas are among the best of Fr. literature. They are characterised by a tenderness of feeling and delicacy of sentiment that would be hard to match, and are written in a most lucid and charming style.

During the middle of the century arose the Parnassian school of poetry, whose leader, Théophile Gautier, shrinking from the undue self-expression of the romanticists, formulated the doctrine of *L'Art pour l'art*. Poems, like paintings or scenery, should appeal to our sense of beauty and not to our sympathies. Such a theory, if carried too far, leads necessarily to mere impersonality and frigidity. Gautier published his poems under the title of *Émaux et Camées*, which well characterise the style of his work. His principal followers were Leconte de Lisle, Heredia, and Baudelaire. Sully Prudhomme (1839-1908) was at first also a Parnassian, but did not remain so. He is the most philosophic of Fr. poets, and has a very clear and smooth style.

François Coppée (1842-1908) was the singer of mean life. Paul Verlaine (1844-96) with Mallarmé (1842-98) founded the Symbolist school of poetry, suggestive, capricious, and at times obscure.

History and literary criticism showed great virility in the nineteenth century. The principal critics were Villemain, who inaugurated comparative and historical criticism, Sainte-Beuve, writer of *Les Lundis*, *Port-Royal*, and *Portraits Littéraires*, Taine and Brunetière. Among the historians the most celebrated are Augustin Thierry (1795-1856), whose theory of the rivalry of race is propounded in *La Conquête de l'Angleterre*



C. A. SAINTE-BEUVE (1804-69)

par les Normands and *Le Tiers Etat*. His most picturesque work is *Récits des Temps mérovingiens*. Guizot (1787-1874) studied history in a philosophical spirit and paid special attention to it as a social science. Thiers (1797-1877) is extremely well informed, industrious, exact, and clear. His two great works are *L'Histoire de la Révolution française* and *L'Histoire du Consulat et de l'Empire*. Michelet (1798-1874) is distinguished by the poetical quality of his historical writings, which, however, gradually got the better of his historical judgment. His *Histoire de France* thereby loses in value after the first six volumes. Frustel de Coulanges (1830-89) is the greatest representative of the scientific method of treating history. His method is to arrive at facts, collate them and analyse them, leaving the conclusion to be drawn apart from the personality of the historian. Renan

(1823-92) is the historian of the Christian religion. Educated for the priesthood, he abandoned it owing to inability to accept Christian dogmas. His *Vie de Jésus* (part of the *Histoire des Origines du Christianisme*) roused a great controversy, and is remarkable for being a sympathetic study of Christ by a sceptic. Taine is also celebrated for his analyses and his portraits. His chief historical work is *Origines de la France contemporaine*.

Of the writers of comedies Scribe (1791-1861) was the most prolific, producing some 400 pieces. He is an admirable constructor of plots and very witty. His best work is perhaps *Le Verre d'Eau*. Emile Augier (1820-89) distinguished himself as the defender of morality and the family. *Le Gendre de M. Poirier* is his best known comedy. Victorien Sardou (1831-1908) was a disciple of Scribe. Dumas fils wrote paradoxical comedies, dealing chiefly with marriage and divorce. With Emile Rostand (*Cyrano de Bergerac* and *Chantecler*) the comedy has again turned towards idealism and poetry.

As regards novelists, the names of Chateaubriand and Hugo have already been mentioned. George Sand (1804-76) was a prolific woman writer who wrote successively romantic, socialist, and pastoral novels, of which *Indiana*, *Le Meunier d'Angibault*, and *La Mare au Diable* are respective types. Stendhal, whose real name was Henry Beyle (1788-1842), wrote novels of a psychological and realistic character, such as *La Chartreuse de Parme* and *Le Rouge et le Noir*. Balzac (1799-1850) is the greatest of Fr. novelists. He is the most fertile creator of types, and excels in delineation of character. His collection of works is called *La Comédie humaine*, divided into *Scènes de la Vie privée*, *Scènes de la Vie de province*, *Scènes de la Vie parisienne*, etc. His best works are *Eugénie Grandet* and *Le Père Goriot*. Gustave Flaubert originated what is known as the realistic or naturalistic school by his *Mme. Bovary*, which was followed by a historical romance, *Satanstoe*, a story of Carthage. The greatest writer of the naturalist school was Emile Zola (1840-1900), who is both vigorous and brutal. His chief disciple was Guy de Maupassant, who, besides writing novels of doubtful tone, also excelled in the short story. Dumas père (1803-70) wrote romantic novels such as *Les Trois Mousquetaires* and *Monte Cristo*, which are of considerable interest. Mérimée (1803-70) wrote several novels in sober and concise style, best known of which is *Colomba*, the story of a Corsican vendetta. Jules and Emile Goncourt

produced in collaboration. They are scrupulously exact in their observation. Daudet (1840-97) is a humorist whose best character is the celebrated Tartarin of Tarascon. Other novelists of the nineteenth century are Paul Bourget (*q.v.*), whose special sphere lay in the psychological novel and the novel of high life, and Pierre Loti (*q.v.*), who wrote exotic novels, descriptive of foreign countries and character, particularly Moroccan. Anatole France (*q.v.*) (1844-1924), a novelist who wrote both in the nineteenth and twentieth centuries, needs to be classed by himself. His style was simple, clear and finished, but his intellect was keen. Both irony and a diabolical subtlety of wit are to be found underlying most of his tales. Besides being a novelist, he also wrote a history of Joan of Arc. The dominant note of twentieth-century F. L. since the Great War (and to a certain extent before) has been scepticism, and many writers have found a refuge in concentration on the Self. Marcel Proust (*q.v.*) (1862-1922), many of whose works have been published since his death, is representative of his age. In his novels we find egoism, disillusion, the power of analysis and a degree of mysticism. During the twentieth century the novel has still remained popular, but schools of novelists have practically disappeared. About nine hundred F. writers were killed during the War, so that many authors writing before the war never reached maturity. René Bazin (*q.v.*), Henri Bordeaux (*q.v.*) and Marcel Prévost (*q.v.*) are all novelists whose reputations were made before 1914. Other novelists, both men and women, who were known before the Great War but have become more famous since are Georges Duhamel, Eugène Montfort, Paul Adam, André Gide (*q.v.*), Jérôme and Jean Tharaud, Jules Romanin, who is influenced by an earlier socialist novelist, Charles-Louis Philippe, 1874-1909, Pierre Hamp, who has written magnificent novels about the world of labour, Robert Valéry Radot, Charles Vildrac, Comtesse de Martel, Jane Marin, Léon Frapié, Gaston Chérau, Claude Farrère, Colette Yver, Pierre Mille, Comtesse Mathieu de Noilet, Gérard D'Houville, André Cortis, Jean-Richard Bloch, Edmund Jaloux and Raymond Machard; while Ernest Psychari and André Lafon were both novelists who were killed in the War. The Academy Goncourt, founded on a legacy left by Edmund Jules de Goncourt, has influenced the Fr. novel very much in the same way as the Théâtre Libre influenced Fr.

drama. The Goncourt Prize offered by the Academy has proved an incentive to young writers. The Great War produced a number of war novels, and the greatest of these war novelists is Henri Barbusse, whose novel *le Feu* was awarded the Goncourt Prize. Barbusse published three books before 1914, but, until the publication of *le Feu*, was comparatively unknown. Other war novelists are Jean de Vignes Rouges, Roland Dorgèes and Paul Cozin, while other post-war novelists are Henri Brémont and Georges Bernamos. Marcel Proust also did not become famous until after 1919.



PROSPER MÉRIMÉE (1803-70)

The first reactionary poet after the Parnassian school of poets was Francis Jammes (b. 1868). Jammes is at his best as an elegiac poet. In 1904 he became converted to the Catholic religion, and since then his poems have become more restrained. His influence on Fr. contemporary poetry has been considerable. Followers of Jammes are Charles Guérin and Mathieu de Noailles. Another Catholic poet was Louis Mercier, whose writings with those of Paul Claudel (*q.v.*) reveal realism and mysticism, while another early twentieth-century poet was Charles Pegny, killed in 1914. Followers of Mallarmé are Louis Cardonnel and Paul Valéry, who is the greatest twentieth century Fr. poet. During the twentieth century there have been in France as many schools of poetry as of painting, but few have proved of lasting importance; free-verse, however, has been the common bond between many.

XIX^e Siècle; P. Morillot, *Le Roman en France*, 1892.—Twentieth Century. R. Lolon, *Contemporary French Literature*, 1925; J. Isaacs, *Contemporary Movements in European Literature*, 1928. The best works of reference on general Fr. literature are those of Doumic, Lanson, Des Granges, Demogeot, and Petit de Juleville. For Fr. philology see Darmesteter's *Cours de Grammaire historique* and the works of Brachet and Littré.

Art.—During the Middle Ages the great cathedrals and churches were built and were decorated with sculpture, metal work and stained glass. Miniature painting and illuminating were also practised at this time, and some of the most famous illuminated psalters came from Paris. Architecture continued during the Renaissance, when the many châteaux were built, and the art of enamelling was developed. Artists of the seventeenth and eighteenth centuries of special importance are Claude Lorraine (see CLAUDE LORRAINE), a classic landscape painter, Watteau and Chardin. It is during the last hundred years that Fr. painting has risen to such importance as to set the lead for all Western Art. Among nineteenth-century painters Ingres, Delacroix, Corot, Daumier, Coubert, Manet, Cézanne, Gauguin, Degas, Monet and Renoir must be mentioned, and the more recent Utrillo, Brague, Matisse and Picasso; also the sculptor Rodin. Two nineteenth-century musicians who have become world-famous are César Franck (*q.v.*), a naturalised Frenchman, and Debussy (*q.v.*). For a more detailed account see under ART; PAINTING; SCULPTURE; etc.

History.—The history of F. prior to the Rom. invasion and conquest is as veiled and shadowy as is that of our own country. Caesar is the first historian of Gaul, just as he is the first historian of Britain. The civilisation of the East had affected but little the countries between the Rhine and the Atlantic, and although we may conjecture much archæologically, yet there is little that we can state as definite fact. The Phœnicians and Gks. certainly had left their mark in Gaul by the establishment of the trading station which afterwards developed into the tn. of Marseilles, but that was all. With the invasion of Gaul by Julius Cæsar, however, the history of F. begins. By Cæsar Gaul is divided into three parts, corresponding roughly with the following divisions: S. of the Garonne, the Aquitainians; from Garonne to Seine, the Celts; and from Seine to Rhine, the Belgæ. We know that these races were composed of uncultivated

tribes, and yet tribes which had risen to as high a state of civilisation as was possible without outside influence. The Gauls rapidly assimilated the civilisation and culture of Rome; they adopted a form of its language, they accepted its laws and its administration. Protected from the savage hordes beyond the Rhine by the military stations of the Roms., they rapidly became a peaceful and contented race. Rom. colonies sprang up all over the country, schools were built, learning flourished, and by the second century A.D. Gaul was regarded very much in the light of the centre of learning of the Rom. empire. Christianity was taught and accepted, and the people of Gaul proved their worth by the help which they gave to the Rom. empire. Gaul more than any other of the Rom. possessions may be said to have assimilated all that was best in the Rom. empire, and to have fallen least under the influence of the East. But with the decline of the Rom. empire Gaul rapidly fell under aristocratic influence. She also began to suffer from the invasions of the outside barbaric tribes, and crushing of the poorer classes by the aristocracy and clergy led to the outbreak of many revolts which were cruelly suppressed. From 395 onwards the hosts of Goths, Vandals, and Burgundians, who had long been pent up E. of the Rhine, commenced their attacks upon the W. The Burgundians were the first to settle, and they founded a kingdom which stretched down the Rhine valley from the Vosges to the sea. The Vandals, ever pressing westwards, founded a Visigothic kingdom in Spain, a kingdom which, however, included that part of Gaul which Cæsar had called Aquitaine, together with a part of the Celtic domain. In 451 at the great battle of the Catalaunian plain Ætius, the last of the Roms. in Gaul, defeated the Huns of Attila, being assisted not only by the Rom. arms of Gaul, but by the barbaric hosts also who rallied round the Rom. general on this occasion against a common enemy. The most important of the barbaric invaders of Gaul was Clovis, the Merovingian king of the Franks. The Franks were a Teutonic tribe who had lived in Belgium (the Salian Franks) and on the banks of the Sambre and the Meuse (the Ripuarians). Led by their king (Clovis, 481–511), the Franks invaded Gaul and quickly overran it, advancing rapidly towards Paris, which they made their capital after they had overcome the last Rom. governor. The master-stroke of the Fr. King Clovis was his adoption of the

Christian faith. Chroniclers of the time speak of the ruffianly king as his most Christian majesty; he was recognised by Rome; he was made a consul and patrician by the Emperor of the East, and by his adoption of the True Faith he united Gaul in religion and made possible the unity of her laws. The kings of Burgundy and the kings of the Ostrogoths were Christians also, but both were tainted with the heresy of Arianism; it therefore remained for Clovis to receive baptism and to become the acknowledged king of France because he was a Catholic and not an Arian. No more bloodthirsty ruffian could well be found in the history of Europe than this sanguinary king, and yet contemporary documents give him place in Paradise, whilst that most enlightened of monarchs, Theodoric (an Arian), is borne off, on the testimony of the same documents, to everlasting torment. The Franks maintained their old Salic law, but at the same time they adopted the civilisation of Rom. Gaul. Even as the Gauls had assimilated the culture, law, and administration of Rome, so did the Franks accept the same from the Gauls. Clovis was the founder of the Merovingian line of kings. Up to the time of the conquest of Gaul the Merovingians had been but chieftains of roving tribes; now, however, they inherited the monarchy of F., and with it, to a very great extent, the imperial ideals which were kept up by the officials who represented their power throughout the land, and who were chosen from the original inhabitants of the land. The king held in his own hands the reins of justice, finance, and administration. But the Merovingian line spent too much of their time in quarrelling amongst themselves. They had originally gained their power by the fresh vigour of a young race in opposition to the effete decadence of the Rom. empire, but gradually they themselves became effete; their vigour declined, and the descendants of the god Merovin failed to lead their people in war, or to protect them in peace. They were also continually quarrelling amongst themselves, and so grew up the power of the Mayors of the Palace. These officials, originally the chief of the officials which Rom. ideals had left in Gaul, gradually won for themselves a position which was greater than that of the king himself. A long line of puppet Merovingians followed; occasionally one stronger than his predecessor would arise, and then for a short time a struggle between mayor and king would take place, but the Mayors of the Palace won, and the line of *rois fainçants*

continued just as long as the Mayors of the Palace cared to let them. The Merovingians had failed in their duty, and to this more than anything else they owed their downfall. Finally the Mayors of the Palace became so powerful that although they still continued the practice of choosing kings from the ancient line, they themselves were openly recognised as the real wielders of the royal authority. The Merovingian line was maintained until 732, although Charles Martel, from 737-741, ruled as a Mayor of the Palace without even a nominal king. The greatness of the Carolingian dynasty begins with Charles Martel, who united in himself the lines of Pippin and Adnult, and can therefore be said to have represented Church and State. Charles Martel was responsible for the overthrow of the Arabs at Tours (732), and for expeditions into Ger., during which he helped on to a very great extent the missionary efforts of the Church. He was supported by the Church, and established that policy which led the Carolingians to be all strong supporters of the Church, which was at this time the only expression of the imperial ideal. In 741 he died, and was succeeded by his sons, Caroloman, who shortly retired to a monastery, and Pippin, better known as Pippin the Short, who finally, in 751, took the name as well as the power of king. The most important side of the reign of Pippin the Short is that of his connection with the papacy. The vicars of Rome were at this time just rising to a full realisation of their power and demanding recognition as the heads of the Church. The rising powers of the papacy, joined to the rising power of the Carolingians, was well-nigh unconquerable, and Pippin was not slow to recognise the benefits of such an alliance. He was protector of the Church; twice he descended into Italy and forced the king of the Lombards to cede him possessions which he in turn ceded to the papacy, and thus gave the papacy its claim to temporal greatness, which persisted right up to 1870. He was crowned and sanctified by the pope (Stephen II.), and regarded himself not only as a king but as a priest also. Even as the adoption of the Catholic faith had been the basis of the greatness of the Merovingian Clovis, so was the alliance with the papacy the basis of the greatness of the Carolingian Pippin. In addition to the greatness which he brought his house and country by his alliance with the papacy, he found time to beat back the Saxons, to drive away the Arabs, and definitely to make Aquitaine a part of the kingdom of F.

This was the position when he died in 768. He left two sons to succeed him, Charles the Great (Charlemagne) and Carloman. It is one of the defects of the Carolingian dynasty that the death of a king usually meant the division of the kingdom, and not infrequently led to civil war. This was, in fact, an essential cause of the ultimate decay of the Carolingian line. But decay was not yet to come. The brightest day of the Carolingian period was, in fact, about to dawn. At first it seemed that the Neustrian king (Carloman) would, by his ambition and his restless spirit, cause the break-up of the kingdom, but three years after his accession he died, and although he left sons, still Charles the Great was accepted by the Church and the baronage as king both of Austrasia and Neustria. Charles continued the policy of his father; he crossed the Alps to the help of the papacy again; he restored the gift of Pippin the Short; he crushed the Lombards. Then he turned his attention to the Saxon and the Arab, and after many campaigns he finally crushed also their power. He fought the Avars of Hungary; he defeated the Danes, who were at this time just beginning to make their power felt. He was to all intents and purposes overlord of Western Europe. His power was recognised in the East, the Moor trembled at his name; the king of Mercia was made more powerful by his recognition. He now felt that the time had come when he could claim for himself the position of the Emperor of the West, and re-establish a Western empire. There were difficulties in the way, but those were overcome, and on Christmas eve of the year 800 he was crowned with the imperial crown by the pope, who also did him homage. Thus was re-established the mediæval ideal of a united Church and Empire: the domination of the world by pope and emperor working together for its good. The immediate results of this coronation were that the papacy became the greatest power in Italy, and the title of Charles the Great to the Frankish kingdom was considerably strengthened. But there was also the great disadvantage not yet perceived, but which was bound to come: the empire and the papacy were equal—they between them were to rule the world—but for how long would they work in unity? The ideal of a dual head was good in theory, how long would it continue in practice. By the time Charles the Great assumed the imperial crown in 800, all the elements necessary for the subsequent break-

up of the Western empire were present. Not that the administration of the empire was not good: Charles had restored peace and order; under his influence schools and churches had flourished. His campaigns had not only been for conquest but for conversion also. He had helped to establish as the law of the empire the customs which had up to that time prevailed, but he probably did not even conjecture that within a generation of his death the empire that he had laboured to build and that he had guarded so jealously would be in ruins. Charles, although he had realised the very real danger which threatened the empire from the incursions of the Danes, nevertheless failed to grasp the idea that this danger must be guarded against by the unity of the empire. He helped in the disruption of his own empire by the divisions he made himself. This empire was split up and divided between his sons Charles, Pippin, and Louis. The two former died very shortly after their father, but Louis the Pious was no wiser. He partitioned his empire whilst his sons were yet alive, and this led to constant quarrelling and revolt. Finally, after his death, the empire was definitely partitioned between his three sons, and the three kingdoms of F., Ger., and Italy may be said to have been founded by this partition (treaty of Verdun, 843). For the next century and a half the history of F. and of the Holy Rom. empire is simply the story of constant war and rebellion. Charles the Great had realised the tendency of the rapidly-growing feudal baronage towards the decentralisation of the power of the crown, and had to an extent prevented it. But his descendants were not strong enough to do this, and the great enemies of order and the power of the crown during this period are the baronage and the Northmen. The trouble with the Northmen had commenced with the reign of Charles the Great: during the troublous times of his descendants they took advantage of the weakness of the central authority and poured into France. Towns were captured and pillaged, Rouen, Bordeaux, and Aachen all fell into the hands of the Northmen. Paris itself in 886 underwent a terrible siege, and yet no peace came to the land. The king (Charles the Bald) tried to buy them off, but they came again and again, each time with fresh demands. The Northmen settled at the mouths of the rivers, and from there ravaged the country. Finally, in 899, Paris was again besieged. Charles the Bald was driven from the throne, and Count Odo elected king of F., but he

owed his election solely to the need of driving away the Northmen, and he was kept on the throne only by the influence of the nobles. In 911 Charles the Simple, who had succeeded Odo, made peace with the Northmen, and ceded them Normandy (the mouth of the Seine). Rollo became a Christian, paid homage of a sort to the king, and then settled in his own territory. The Northmen soon showed that they were easily able to assimilate the culture, language, and customs of the Fr., and before long had lost their old northern coarseness and tongue, and had become a Fr. speaking chivalrous nation while still retaining the vigour of their original race. Charles the Simple showed himself as incapable as Charles the Bald, and rapidly the Carolingians became as weak as the Merovingians had been, but they still retained some of their former power. Louis IV. tried hard to win back prestige for the crown and to put down the power of the nobles, but Hugh, Count of Paris, overshadowed him. Although Hugh could easily have declared himself king of F., he maintained the old Carolingian line, leaving it to his son, Hugh Capet, to found the Capetian dynasty. In May 987 Louis V. died, the last of the direct line of the Carolingians, and Hugh Capet was elected king by the Church and the baronage. It was the victory of the feudal system over the monarchy. The first few Capetian kings were merely great feudal nobles who were given the royal title and a nominal allegiance, but who were in no way recognised as being any greater or more powerful than the other great feudal nobles. F. had by this time become a feudal monarchy, that is a monarchy composed of feudal states. Normandy, Aquitaine, Flanders, Champagne, Poitou, and Brittany were all more or less independent states. But Hugh Capet did at least one great thing for the Fr. monarchy: he added to an *effete* power the *Ile de France* and Paris, and also he was the first Fr. king with *national* ideals. He made no claims to universal empire, he regarded F. as his realm, he spoke Fr., and he had ambitions only for F. But the power of these early kings was but nominal. Hugh Capet (987-996), Robert II. (996-1031), and Henry I. (1031-1066) had no real power. The influence of Normandy, however, must not be overlooked. The Normans had taken part in all the great movements of the time; they had supported the Cluniac Reformation, they had supported the Capetian dynasty, and although they owed allegiance to the Fr. king, they were in reality much more power-

ful than he. Henry I. tried conclusions with Normandy and was defeated. Baldwin of Flanders, father-in-law of the Conqueror, and regent for Philip I., did not in any way hinder William, Duke of Normandy, from invading England. In fact, Normandy was untroubled until the end of the Conqueror's reign. In the meantime the Fr. kings had revived the ancient Carolingian claims to the Middle Kingdom and to sovereignty over the Church, and the power of the Church had certainly been overcome in F. itself, but the great struggle of empire and papacy



LOUIS IX.
(Saint Louis)

was within sight, and Hildebrand, with his ideals of the universal power of the papacy, was preaching them during the reign of Philip. In the meantime the king had made some addition to the royal territory: by giving to a scion of the royal house lapsed fiefs and annexing the Vexin and the Valois he added to the power of the crown S. of the Loire, and built up a protection to himself from the attacks of the Normans and Champagne. Philip I. struggled against William of Normandy toward the end of his reign, and had great trouble with the papacy, being excommunicated. During his reign occurred the First Crusade. This was essentially a Fr. movement, and took out of F. many of the barons. Philip, however, took no active part in it, but, on the whole, it was good for F., since it raised the reputation

of her soldiers, and it also took a number of the troublous barons out of the country.

The Capetian monarchy, however, was still far from strong. Under Louis VI., however, it began to increase rapidly, and under his famous grandson, Philip Augustus, it became definitely established. Louis V. had quarrelled with the papacy; Louis VI. by an alliance with the Church strengthened the power of the crown, but still kept strict control over the Fr. clergy. By the influence of Abbot Suger he established a strong central control. He firmly established his power in his own domains, and by supporting the Communal movement he raised up a support for the crown which to a great extent balanced the power of the nobility. He attacked the power of Henry I. of England in Normandy, and attempted to check the power of the Counts of Blois. The house of Blois, however, was strengthened by the accession of Stephen of Blois to the crown of England; this, however, was neutralised by the marriage in 1137 of Louis' son to the heiress of Aquitaine. Louis died in 1137, and was succeeded by Louis VII. During Louis VI.'s reign, St. Bernard had exercised an influence of vast importance throughout the whole of Europe. Louis VIII.'s reign saw a reaction of the feudal baronage against the power of the crown, which was, however, repressed. Louis VII., in 1147, set out on the Second Crusade, which proved, however, the opposite of glorious. The power of the crown, however, did not decrease during the royal absence, and the administration under Suger was both wise and capable. In 1152, however, Louis VII. divorced Eleanor of Aquitaine, who six weeks afterwards married Henry of Anjou, King of England and ruler of the Angevin empire. Henry II.'s power was by far the greatest danger which the monarchy in F. had yet to face. By his marriage Henry II had established an empire which extended from the Pyrenees to the Cheviots; he ruled in F., Normandy, Maine, Anjou, Touraine, Gascony, Aquitaine, and Poitou. The Angevins were obviously the enemies of F., and war was inevitable. But the weakness of the Angevins became obvious from the frequent rebellions of Henry's sons against their father. The two greatest dangers to the Fr. monarchy had arisen during the reign; the fear of the power of the house of Blois, and the rise of the Angevin empire. But the alliance with the Church and the sane administration of the royal power had tended much to increase royal power in F. The accession of Philip

Augustus (1180-1223) marks the highest point to which the monarchy had risen. By skilful attacks on the house of Blois he consolidated Fr. power in the N., and by alliances with the rebellious sons of Henry II. he prepared the way for the break-up of the power of the Angevins. In 1191 he took part in the Third Crusade, and in the same year returned to plot the further overthrow of the house of Anjou. Before Richard's return he had attempted to seize the greater part of Normandy, but had failed, and Richard built up a strong alliance against him which threatened the overthrow of his power. But in 1199 the death of Richard and the accession of John made clear the way for the overthrow of Angevin power in F. The lack of vigour on the part of John made the conquest of the Angevin possessions easy, and by 1204 practically all those possessions had passed out of his hands. But John made one more great effort. He built up an alliance of the powers of Europe against Philip, but even that failed. The battle of Bouvines (1214) founded definitely the power of F. in the N. The Communes, whom he had always befriended, fought for him here, and justified his policy towards them. Then for a time he paused. He took no active part in the troubles in England, where the baronage had wrung from the king a reluctant consent to the Great Charter. But John kept no promise long, and his alliance with the papacy enabled him again to defy the baronage, who invited Louis, son of Philip, to become their king. Philip, however, remained neutral, although his son crossed over to England. Finally the Albigensian Crusades gave Philip a hold on the S., a hold which was strengthened by his son and grandson. Administration, justice, law, had all been firmly established during his reign, and in 1223, when Philip died, he left a F. strong, consolidated, and powerful in the councils of Europe. In many ways he may be compared to the man whose power he broke, Henry II.

Louis VIII. (1223-1226) succeeded quietly and continued the work of his father. He had, however, just completed his consolidation of the S. of F. when sickness broke out in his army and he died. His son, Louis IX. (1226-1270), usually known as St. Louis, was only twelve years of age when his father died. His mother, Blanche of Castile, ruled for him, and during the period of the regency, as was not unnatural, there was a feudal reaction. The united efforts of the queen, Church, and people combined to put this down, and

although Henry III. of England was able to win some small victories in Poitou, still, on the whole, the power of the monarchy was maintained. The power of the crown was largely extended during this reign in the S., and Henry III.'s attempts to reconquer the Fr. possessions of his house were a failure. Louis himself was noted for the piety of his life, a piety, however, supported by good generalship, statesmanship, and vigour. In 1235 began his period of personal rule, and during that period F. flourished. He continued the work of his grandfather (Philip Augustus), and made numerous important administrative improvements. In 1248 he went on his first crusade, which ended, in 1249, in the disaster and surrender at Damietta. He returned to F. in 1254. He maintained a policy of neutrality towards the struggle of empire and papacy, was lenient in his dealings with Henry III. of England, and strengthened the relations between F. and Spain. Perhaps the most important side of his reign was the development of the Parlement de Paris, and the subjugation of the feudal nobles by depriving them of their rights to judicial combat and private war. During his reign also was developed the University of Paris, and he himself founded the Sorbonne. His reign was one of the most glorious F. has ever experienced, and he himself, judged from the point of view of Christian general or statesman, must be adjudged truly great. He was succeeded by Philip III. (the Bold) (1270-85), during whose reign progress continued steadily. Events outside F. influenced its history to a very great extent. The Sicilian Vespers put an end to the power of the Fr. in Italy, where Charles of Anjou, a clever and unscrupulous brother of St. Louis, had established a kingdom, whilst the provinces of Anjou, Toulouse, and Auvergne, together with Provence, fell into the power of the crown. Champagne was also united to the crown during this reign. Agen and Agenois were by the treaty of Amiens ceded to the English. Philip IV. (1285-1314) succeeded. Philip was cunning, unscrupulous, and ambitious. He desired to weld F. into one compact kingdom, to extend her power, and to make her even greater than she was. In 1286 he had recognised Edwards I.'s claim to Gascony and Aquitaine, but from that time onwards it became the chief aim of the Fr. king to win them back. Taking as a pretext the quarrels between the sailors of the Cinque Ports and the men of Normandy, he cited Edward to appear

at his court in Paris. Edward had his hands full at home, failed to put in any appearance, and Gascony and Aquitaine were declared forfeited. Edward now built up a strong alliance against Philip, but he also allied himself with the Scots, and so commenced the traditional alliance which lasted down to 1560. In 1300 he annexed Flanders to F., and was two years later defeated at Courtrai (1302). This victory was important, because it showed the beginning of the overthrow of the feudal cavalry by an efficient infantry. He quarrelled with the clergy after the promulgation of the bull *Clericis Laicos*, but was finally reconciled, but again irritated by the claims of Boniface VIII., he seized the pope and kept him a prisoner until his death in 1303. The next pope, Benedict XI., supported the Italian party and was poisoned, whilst his successor, Clement V., took up his residence at Avignon. It was at this time that Philip suppressed the order of the Knights Templar. Important changes were made in the king's covenant, and the power of the Parlement de Paris was also strengthened. Philip also summoned the States-general, which consisted of representatives of the nobles, clergy, and citizens. They were summoned first in 1302, and again in 1308 and 1314. The death of Philip the Fair saw the beginning of a rapid decline in the power of the monarchy in F. The three sons of Philip all reigned in rapid succession, Louis X. (1314-16), Philip V. (1316-22), and Charles IV. (1322-8). During Louis X.'s reign there was a feudal reaction and the nobles increased their power. On his death his daughter was declared incapable of ascending the throne by reason of the 'Salic law.' His brother, therefore, succeeded him, and finally, with Charles IV., a stray king who ruled only six years, the crown passed from the main line of the Capetians to the cadet house of Valois. Philip of Valois, the sixth of that name, seemed to have firmly established himself on the Fr. throne, when, by the pursuit of an injudicious but not unnatural policy, he roused the hatred of the English and began the Hundred Years' War. This war has too often been regarded simply as a war of succession caused by Edward III.'s claim to the throne of F. This in reality was but an unimportant cause. Philip's policy of conquest in Gascony and Aquitaine, his interferences in Flanders, and hence his hindering of the English woollen trade, and the help which he gave to the Scots, were the real causes of the war. The succession

question in Brittany gave Edward III. an opportunity of retaliating in F., and the Fr. found themselves attacked from Aquitaine, Brittany, and Flanders at one and the same time. Sluys was won in 1340, Crécy in 1346, and in the following year Calais surrendered. For three years war was stopped by the outbreak of the Black Death (1347-50), and in 1350 Philip VI. died. He was succeeded by King John (1350-69), who was defeated and captured by the Black Prince at Poitiers (1356). The regency of the Dauphin Charles during the imprisonment of King John led to an attempt on the part of the States-general to control the policy of F., and this, being opposed by the baronage, led to civil war and the peasant risings known as the Jacquerie. In 1360, civil war having been put down and the leader Etienne Marcel murdered, peace was made with England. By this treaty Edward gave up his claim to the Fr. throne and received large territories to the S. of the Loire. In 1364 John died. Before his death he had established his fourth son as Duke of Burgundy, and thus founded the Valois house, which in the next century gave so much trouble to F. Charles V. (1364-80), who succeeded John, was successful in establishing again the power of the crown, crushed the power of the States-general, and restored order to the country. He was successful also in driving the English from many of the possessions that they had gained, and after 1373, when the Black Prince retired from his province of Aquitaine, he was able to re-establish Fr. power in much of the S. In 1375 the peace of Bruges brought to an end the first period of the Hundred Years' War. Charles, however, failed to annex Brittany, although he was successful both against the English and Spaniards. He, however, depended largely for his success upon the generalship of Bertrand du Guesclin, who had adopted defensive tactics. The regency which was necessary owing to the minority of Charles VI. (1380-1422) witnessed another feudal reaction. This was a troublous time not only for F. but Europe, revolts of the Commons taking place in nearly every country. Charles, who had taken affairs into his own hands in 1385, became insane in 1392; this led to the quarrels between the powerful families of the Orleanists (Armagnacs) and the party of Burgundy. The dukes of Burgundy had by this time become powerful princes, whose ambitions tended to make them less and less Fr., until we find Charles the Bold

attempting to found an independent kingdom. The Armagnacs were the feudal party, the Burgundians the party of the Parisians upon whom they relied chiefly for help. The quarrels of these two parties permitted the Lancastrian *coup d'état* to take place quietly in England and later hastened the success of Henry V. The Burgundians, infuriated by the murder of their duke, allied themselves with the English, and obtained control of the mad King Charles. Henry V., renewing the quarrel with F., won the battle of Agincourt (1415), and later, with the help of the Burgundians, overran the N. of F. and forced the Fr. to sign the treaty of Troyes. By this treaty Henry V. became regent of F., married the king's daughter, Catherine, and was to succeed to the Fr. throne on the death of the king. Henry, however, died before Charles VI., and his young son, Henry VI., was proclaimed king on the death of Charles. The greatest successes of the English had, however, already been won. Simultaneously with the proclamation of Henry VI. in Paris, Charles VII. was proclaimed at Bourges. But it was impossible for the Fr. to succeed in driving out the English until they had settled their own internal quarrels. It was the internal dissensions of F. that had given the English their opportunity; it was the revival of national sentiment which finally drove them out. Although the Duke of Bedford ruled wisely as regent, he was able only to control the N. of F. and the conduct of Gloucester drove the Burgundians into the arms of the Fr. national party. Again, the appearance of Jeanne d'Arc and the encouragement which her victories gave to the Fr. helped to a tremendous extent in bringing about the ultimate downfall of English power. In 1435 the treaty of Arras was concluded between the Burgundians and the Fr.; the Burgundians gave up the English alliance and prepared to help to drive their former allies out of the country. In the same year Bedford died. In the following year Paris was recaptured, the power of the crown was increased by the granting of a national revenue and the control of the forces, and a despotism was made possible. Gradually the conquests of the English were won back until by 1453 Calais alone remained in the hands of the English king. It must be noticed, however, that the downfall of the English power in F. coincided with the beginning of the baronial troubles in England. York played the part of Burgundy save that he did *not* ally himself with the

enemies of a national England. In the meantime, freed from the troubles of foreign invasion, Charles VII. had to turn his attention to internal affairs. Burgundy was consolidating his powers, and Charles realised that the ambitions of the Duke of Burgundy would be a great source of danger to F. In 1461 Charles VII. died, and was succeeded by his son, Louis XI., who had been a source of great trouble during his father's life-time. As a monarch, however, he proved a strong supporter of the power of the monarchy, and did more than any other monarch to strengthen its power in F. The beginning of his reign, however, was not propitious. He alienated Charles the Bold of Burgundy, his nobility, and his clergy, and by the want of wisdom of his acts welded them together in the League of Public Weal. He was practically forced to concede them the terms they demanded by the treaty of Conflans, but then he determined to win what he had lost. He raised up rebellions in Liège, and whilst Burgundy was occupied in putting that down he won back Normandy, which by the treaty of Conflans he had ceded without interference. After 1467 he had to oppose the schemes of Charles the Bold. He managed to hold his own fairly well until the failure of Warwick and the Lancastrians in England brought his fortunes down to a low point. He was already at war with Burgundy, who, however, was about to embark on his scheme of founding a Middle Kingdom. Charles aimed at occupying the territory of Lorraine and extending his possession down to the Mediterranean. He found that his scheme evoked considerable opposition and tried to occupy the attention of Louis by an English invasion of F. Edward IV., however, was bought off by Louis at the treaty of Pequigny and returned to England. Still intent on his Middle Kingdom, Charles the Bold struggled on, being finally killed at the battle of Nancy in 1477. Louis seized Burgundy and Artois, and finally it was arranged by treaty between Maximilian and Louis that Margaret, the heiress of Burgundy, should marry the Dauphin Charles and bring as her dowry the country of Burgundy and Artois. Louis had at last triumphed. Louis died in 1483. His main work had been the strengthening of royal power. The feudal nobles were crushed, and the despotism of the crown was finally established. The work of Louis made possible the Fr. policy of territorial aggrandisement. F. was governed immediately after the death of Louis XI. by the regent, Anne of Beaujeu. The

great achievement of the regency was the marriage of Charles VIII. to Anne of Brittany, in face of the opposition of the powers of Europe and her marriage by proxy to the Emperor Maximilian. Charles's great scheme was the resuscitation of the old Fr. claim to Naples, and although at first successful, his schemes were too fantastic to be practical, and when he left Italy his conquest melted away. He died in 1498. His reign is important since it can be said to mark the end of the mediæval and the beginning of the modern ages. The old theory of a world empire ruled by the pope and the emperor had passed away, and its place had been taken by the 'nations.'

The history of modern F. begins with the reign of Louis XII., who, although he did his country little good by his mistaken foreign policy, still, at the same time, by his sane and enlightened domestic policy he earned the title of 'Pater Patriæ.' The death of Charles VIII. had again raised the vexed question of the succession in Brittany, and this was again solved by the marriage of Louis XII. to Anne, although in order to do this he had to divorce his former wife. He remitted much taxation, and gave the country an opportunity of becoming prosperous and wealthy. His foreign policy in Italy was a mistake; he failed in his attempt to hold Italy, and he lost other of the possessions of F. His reign is one long story of tortuous diplomatic intrigue; first in the League of Cambrai (1508) he fights with the papacy against the growing power of Venice, next by the Holy League (1511) he finds himself deserted by his one-time allies, and although Gaston de Foix wins for him some successes in Italy, he is forced to make peace. The intrigues of Ferdinand of Spain, Maximilian of the empire, and Henry of England all caused the downfall of his foreign policy. England during this period once more comes to the front as a European power, and by the battle of the Spurs (1513) and Flodden (1513) helps to weaken the power of F. Louis died in 1515. The reign of Francis I. (1515-47) is important in many respects. In the first place we have the beginning of the struggle between the house of Hapsburg and the Fr., the establishment of the Fr. military prestige, the beginning of the alliance between F. and Turkey, and the preparation by the acceptance of Calvinism for the religious wars. Francis eagerly adopted the Italian policy of his predecessors. He won the battle of Marignano (1515), and forced the concordat of Bologna

from the papacy, a concord which gave him practical control of the Church in F. He became a candidate for the empire in 1519, but was unsuccessful, and in 1525 was defeated at Pavia, captured and taken a prisoner to Spain. Here he signed the treaty of Madrid, but failed to keep the terms of that treaty, and so the war dragged on during his reign. Many attempts were made to end it, *e.g.* at Cambrai, but it was not until towards the end of the reign that the treaty of Crespy recognised the actual facts. Francis had also inaugurated the policy of being Catholic in his policy at home and Protestant abroad, but this was only because actual events dictated a policy of that kind. Henry II. (1547-59) was a bigoted Rom. Catholic during his reign. The Protestants were persecuted bitterly in F., although his struggles with Charles V. made a continuance of the Protestant policy necessary abroad. Charles attacked Metz, but was unsuccessful, and finally in 1556 he resigned the crown of Spain to his eldest son. He had done this with the desire that peace should follow, but the war dragged on, chiefly owing to the influence of the Guises in F. Calais was won back in 1552, and in 1559 the treaty of Cateau-Cambrésis put a period to the struggles of the Hapsburgs and the Fr. A few towns in Italy were retained by the Fr., together with the bishoprics of Metz, Toul, and Verdun. The next period of Fr. history is taken up almost entirely with the wars of religion. These wars, which started from religious motives, rapidly assumed the character of political struggles, and for the next forty years F. is in a state of constant turmoil. During the next thirty years the power of the crown in F. is not great, because the kings are weak. The real power lies in the hands of the nobility. Chief amongst the leaders of the nobles were the family of Bourbon, which was Huguenot and which was represented by Antony of Bourbon and his brother Condé, the family of Chatillon represented by the statesman and warrior, Coligny, Admiral of F., also Huguenot; on the other side were the Guises, who, during the reign of Francis II. (1559-60), gained great influence owing to the fact that the queen (Mary Queen of Scots) was their niece, and that they were allied to the queen-mother (Catherine de' Medici), who, although she had not exercised much power during the reign of Henry IV., had great influence after his death. The power of the Guise family declined when Francis II. died. Charles IX. (1560-74), a boy of ten, succeeded, and the regency was

obtained by the queen-mother (Catherine de' Medici). An attempt was made to obtain toleration for the Huguenots, but this was found to be impossible. In 1562 the Guises started the religious wars by killing a number of Huguenot soldiers, and the wars thus started dragged on from 1562-98. There were in all nine civil wars. The Huguenots may on the whole be regarded as the party with national motives. They were to be found principally in the S.W., and were supported by the majority of the nobility, whose motives, however,



CATHERINE DE' MEDICI

were political, and who desired territorial aggrandisement at the expense of the Church. The Huguenots could not, of course, depend upon as large a body of troops as the Catholics, and the Catholics were often also supported by the king of Spain (Philip II.). The consistency of the bourgeoisie and the military skill of Condé and Coligny united to give the Huguenots some chances of victory. Between 1562-70 the Civil War broke out three times, each time the war was ended by a promise of toleration to the Huguenots, and finally, in 1570, matters appeared to be particularly bright for the Huguenots, who were given good terms in the treaty of St. Germain, which terminated the third Civil War. This treaty was due largely to the growing feeling in F. that the real enemy was Spain, and Charles IX. planned a united attack of Protestants and Catholics

on Spain. Charles IX., between 1570-72, was entirely under the influence of Coligny, and this roused the jealousy of the queen-mother, who came over completely to the side of the Catholic party, and planned the assassination of Coligny and the massacre of St. Bartholomew (1572). The effect of this massacre on the Huguenots in F. was enormous, and yet the Fr. crown was still able to maintain its policy of being Protestant abroad. The Huguenots lost their chief leader and statesman and the war developed into a series of sieges. By another treaty, signed in 1573, after the unsuccessful siege of La Rochelle, the Huguenots again received some promise of toleration. The fifth Civil War saw the rise to power of that body known as the Politique. This was an association of men who desired only the peace of the realm, and who supported the Huguenots with that aim during this war. Henry III. (1574-89) declared at first for toleration, and later against the Huguenots. The treaty of Monsieur, however, granted the Huguenots again very good terms, but the Catholics were now beginning to form themselves into leagues. Between 1577-80 two more civil wars broke out, with unimportant results. At the end of the seventh Civil War, the great Catholic League was formed. Its policy was to prevent the accession of Henry of Navarre, the next heir, and a Protestant, and this policy was accepted by Henry III., who gave up his policy of toleration. In 1587 the eighth Civil War broke out; but the League paid but little attention to the claims of the sovereign, and finally Henry of Guise was assassinated by command of Henry III. Paris rose in revolt against the king, who united with Henry of Navarre and besieged it. Henry III. was, however, assassinated himself, and the League was victorious for the time being. Henry of Navarre (1589-1610), was now lawful king, but the League for the time being refused to recognise him. Henry defeated the League at Arques (1589) and Ivry (1590). He next besieged Paris; dissensions were already breaking up the League, and in 1593 Henry, who for a long time had refused to change his creed, became a Catholic, and was recognised by the States-general as king of F. 'Paris was worth a mass,' he said. Henry's first work was to attack Spain and the Catholic League. In 1598 was signed the treaty of Vervins, by which Spain kept but little, and Calais was restored to F. With the aid of Spain taken away, the Catholic League collapsed, and order was restored in F. The reign of

Henry IV. saw the growing popularity of the crown. The people and the nobility rallied round a king who had shown himself both capable and courageous, and the reign of Henry IV. prepared the way for the later despotism of the Fr. monarchy. The Edict of Nantes was issued in 1598. By this edict toleration was granted the Huguenots under certain conditions which were not difficult to comply with. The work of Henry's great minister Sully was also important, since he reformed the finances and justice of F. He also helped to destroy the power of the nobles, and in that way helped forward the aggrandisement of the crown. The establishment of the Paulette during this reign is also important, since by payment of one-sixtieth of their incomes, members of the parlements could make their offices hereditary. Henry IV. was assassinated in 1610, and was succeeded by his son, Louis XIII. (1610-43), who was only nine years of age. The regency was left in the hands of Marie de' Medici, the queen-mother. The period of the regency was one during which the power of the crown declined. The queen was incapable of governing the country, and the nobles began to gain power again. Finally Condé headed a rebellion which resulted in the calling of the States-general for the last time before 1789 (1614). The meeting of the States-general, except for this one fact, was unimportant. In the same year the marriage of Louis XIII. to Anne of Austria, daughter of Philip IV. of Spain, and the marriage of Philip IV. to the Fr. king's sister took place. Two years later Louis XIII. began to rule personally. The queen-mother was sent into retirement, and her favourite was killed. The central figure of interest during the reign of Louis XIII. is Richelieu, who, from 1624-42, dominated the policy of F. Richelieu's foreign policy was directed in order to establish F. as the greatest country in Europe; his domestic policy aimed at the aggrandisement of the crown. The age of Louis XIV. is the logical conclusion of both the foreign and domestic policy of the Cardinal. He had many difficulties to face; from the nobles whose power he crushed, from the Huguenots whose fortress of La Rochelle he took, from the Catholics who thought his religious policy lukewarm, and from outside enemies, especially Spain, who looked askance at the ambitions of F.; but ultimately he triumphed over them all. He continued the policy of being Protestant abroad and Catholic at home. The great Thirty Years' War broke out in 1618, and although F. was not directly

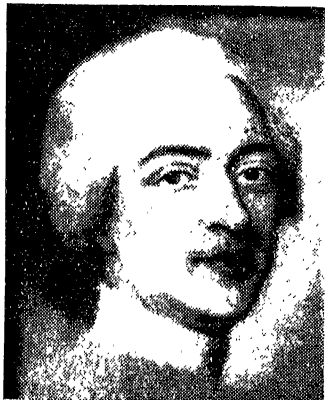
concerned, nevertheless, in order to aim a blow at Austria and Spain, he supported Gustavus Adolphus of Sweden in his attacks against the Catholics. In 1635 he was forced to take an active part in the war itself, and although his policy seemed at first unsuccessful, it ultimately triumphed; the Spanish fleet was destroyed, and Portugal was able to proclaim her independence of Spain (1640). In his domestic policy Richelieu had been equally successful. He had crushed the right of private war, he had summoned no States-general, he had taken away many of the privileges of the Huguenots whilst still leaving them toleration. The Parlement de Paris was subordinated to the royal will and the power of the crown was centralised; the *pays d'état*, which were still ruled by provincial assemblies, lost much of their power, and were subordinated to the power of the central authority. Just previous to his death he put down the conspiracy of Cinq Mars, and in 1642 he died. Louis XIII., who had been completely overshadowed by his great minister, followed him in the next year, and was succeeded by his young son, Louis XIV. (1643-1715). During the first eighteen years of the reign of Louis XIV. Mazarin was the chief minister, and followed in the footsteps of Richelieu, but he was unable to exercise the same firm control which Richelieu had, with the result that, although he was successful abroad, F. itself was plunged into turmoil and disorder. Abroad the victory of Condé at Rocroi made F. the greatest military power in Europe, and this victory was followed in 1645 by the victory at Nordlingen. The result of these victories was that in the treaty of Westphalia, which was signed in 1648, F. was given Lorraine, the bishoprics of Metz, Toul, and Verdun, together with Pinerolo in Italy. The policy of Richelieu had received at last its vindication. At home, however, matters were in a state of disorder. Two civil wars broke out, to which the names First and Second Fronde are applied. The First or Parliamentary Fronde aimed at obtaining various concessions from the crown. This war was ended by the treaty of Ruell. Immediately afterwards the Second or Aristocratic Fronde broke out. This was led by Condé, and was more successful immediately. It was aimed against Mazarin, and that minister had twice to leave the country. But the crown and the minister triumphed, and in 1658 the Second Fronde was finally put down. The treaty of Westphalia, while it had ended the struggle between the empire and F., had, never-

theless, extended the war into Spain. In 1659, however, was signed the treaty of Paris, by which the Spaniards ceded some territory on the Pyrenees.

A marriage alliance was arranged between Louis XIV. and Maria Theresa, the daughter of the Spanish king. This marriage was celebrated in 1660. In the following year Mazarin died and Louis XIV. became his own prime minister. Much of the success of the king was due to the policy of Richelieu and to the advice of Mazarin. But Louis had also learnt much from the civil wars which had broken out during the early part of his reign. He realised that he could trust no power save that of the crown, and resolved to be absolute. He adopted also Richelieu's foreign policy of territorial aggrandisement. The motto which Louis XIV. adopted for himself at the beginning of the reign was '*L'état c'est moi*,' and he consistently moulded his policy on this view. During his reign the king was supreme, the Parlement de Paris might well never have existed, the Church was subordinated to the monarch, the States-general still remained uncalled. Although Louis resolved to be his own first minister, nevertheless he used men of ability to direct affairs. To Colbert, who had charge of the finances of the country during the early part of Louis' reign, F. owes much. The finances were reformed, the taxes more equitably adjusted, the *taille* was reduced, and the *gabelle* (salt tax) was equally distributed. He fostered trade and commerce on a distinctly protective basis, and for the time being, at any rate, trade flourished and increased; the taxes were diminished, and F. was indeed prosperous. Colbert also realised that in order to help Fr. trade the colonies must be helped and developed; the E. and W. Indies were exploited, settlements were made in India, and the colonies in N. America were extended. Nor did Colbert neglect the navy, which he realised must be strong in order to protect the trade and the new colonies. To a very great extent Louis XIV. owes the success of his foreign policy to the financial reforms and the increase of trade and wealth for which the wise administration of Colbert was responsible. The foreign policy of F., as has been remarked, was that of territorial aggrandisement, which included the extension of the boundaries of F. to the Rhine and the Scheldt. But Louis also dreamed of becoming emperor, and placing the Bourbons on the throne of the empire. It was not until fairly late in the

reign that he realised how impossible that was. The War of Devolution broke out in 1667, just after the death of Philip IV. The extension of the power of Louis XIV. over the Netherlands, however, alarmed England and Holland, who formed an alliance with Sweden to prevent Louis from carrying out his aim. Louis, however, who had already agreed with Austria that when Charles II. died the Spanish dominions should be divided, made peace and withdrew from the Netherlands (1668). His next war was with the Dutch (1672-78). This was purely a war of retaliation. Louis realised the part that the Dutch had played in the previous war, and resolved to crush them. Beyond this Louis was already adopting that attitude which was to make him the Catholic champion of Europe, and Holland was Protestant. The Dutch struggled bravely, but in spite of the alliances which were made, Louis was finally triumphant. The treaty of Nimeguen was signed, and the Fr. made great gains in the N. Louis now turned his attention to acquiring the Rhine as the boundary of F. By means of chambers of reunion, he established claims to all Alsace, Lorraine and Luxemburg, and by the treaty of Ratisbon (1684) he was allowed to keep what he claimed for twenty years. But his policy of unnecessary aggression had raised up for him enemies all over Europe. The reunions had made the empire and Spain unfriendly; Holland was of course still hostile; and England, whilst up to 1688 it was servile, after that date, and with the accession of William III., became the centre of opposition to the ambitions of F. From 1678-85 his foreign policy had been a series of mistakes, and in 1685 he made a terrible blunder in his domestic policy. In that year he deliberately revoked the Edict of Nantes. The immediate result was that over a quarter of a million subjects (Huguenots) left F. Trade began to decline, and the Protestants of Europe were deeply offended by the policy. In the meantime, the Catholic policy of James II. in England had brought on the Revolution of 1688. Louis again here made a fatal blunder. Had he invaded or threatened Holland, William could never have crossed to England, but he invaded Germany, and William was able to sail. The Revolution, which Louis thought would lead to years of civil war, was over in a few days, and the appearance of a fugitive James II. at the Fr. court was a crushing blow to Louis. F. was now surrounded by enemies. The war of the Protestant Succession immediately broke

out. The war was waged in Germany, where Louis cruelly laid waste the Palatinate; in Ireland, where the last hopes of the Jacobites were crushed; on the sea, where, by the battle of La Hogue (1692), the sea power of England was finally established; and in the Low Countries, where the war rapidly became simply a war of sieges. The defection of Saxony made a truce necessary, and the treaty of Ryswick, whereby Louis gave up all conquests, with few exceptions, gained since 1678. But the treaty was merely a



LOUIS XV.

[Hachette

truce. The king of Spain was dying, and the ambitious Louis turned to the definite establishment of Bourbon power in Europe. William III. and Louis signed two Partition Treaties, both of which, however, were broken, one by the death of the Electoral Prince Joseph and the second by the acceptance of the will of Charles II. by the F. king. The Spaniards were furious when they learnt of the Partition Treaties, and the Spanish king was only carrying out national policy when he left his dominions to Philip of Anjou, grandson of Louis XIV. England accepted the will also, greatly to the disappointment of William III., but Louis immediately began to plunder. He overran the Netherlands with Fr. troops, and when James II. died, he recognised his son as James III. England immediately put herself at the head of the allies, and the war of the Spanish Succession broke out. It is impossible to follow this war in detail. It lasted

from 1702-13. During the war the Fr. military power was broken by the great victories of the allies at Blenheim (1704), Ramillies (1706), Oudenarde (1708), and Malplaquet (1709), but the successes of the allies in Spain were but transient, and the capture of Gibraltar (1704) was the most important event. The Fr., however, fought bravely, and by their plucky rally at the end of the war, and also owing to the desire of the Tory party in England for peace, they gained terms at the treaty of Utrecht which their earlier performances in the war had certainly not justified. Philip of Anjou was given Spain, the Barrier was restored to Holland, and Austria was given the Spanish Netherlands, together with the Italian possessions. The English were the great gainers by this treaty, however, and by the hold which they were given in America definitely established their supremacy over F. as a colonial power. After Utrecht F. was no longer a threat to Europe, but the centralised and despotic form of government established by Louis XIV. lived on until it was swept away by the Revolution. Louis lived until 1715. He had seen his power broken down, his ambitions had failed, whilst the succession was imperilled. He had continued his policy of religious oppression, but, on the whole, the reign of Louis XIV. must be regarded as the most wonderful of all in Fr. history. Louis XV., who succeeded him, was his great-grandson. Orleans became regent, and immediately a reaction set in against the policy of the late king. Orleans played for popularity. The young king's life was not of the strongest, and Orleans hoped that in the case of his death the crown would pass, not to Philip V. of Spain, who was the nearest heir, but to him (Orleans). He therefore kept up a strict alliance with England, upon whose support he relied. Fr. policy seemed at this time to infuriate the Spaniards, and it was not until after 1729 that the birth of a Dauphin finally dispelled the hopes of succession which Philip V. had, and drew together the Fr. and Spanish Bourbons into a family alliance. The early rule of Louis XV. was complicated by the Polish Succession War and the struggles of Austria and Russia against Turkey. F. was still true to her old policy of alliance with Turkey, and although she did not now openly advocate the claims of Turkey, nevertheless her interests in the East induced her to attempt to strengthen rather than weaken the power of Turkey at the expense of Russia and Austria. The great Cardinal Fleury had just suc-

ceeded in retaining for F. a foremost place amongst the Powers of Europe when the war of the Austrian Succession broke out. The series of wars which were now opening had issues which at the time were not fully comprehended, at any rate, by Fr. foreign ministers. The struggle was no longer for European supremacy, but for world-wide supremacy. Whether England or F. was to be supreme in India and America, was the question which had now to be solved. F. certainly started with an advantage, but her policy of neglecting the navy and the colonies was responsible for her ultimate failure. At first the war began as an attempt on the part of F. still further to injure the power of the house of Hapsburg in Europe, but after 1743 it became a struggle with England for the colonies. Up to that time England and F. had been nominally at peace, but now F. and Spain declared war against Austria and England. The war was fought in Ger., America, and India, and was complicated as far as the house of Hanover was concerned by the F. support of the Pretender. In 1745 Fontenoy was won by the Fr., and in the same year England was disturbed by the rebellion of the '45. Frederick of Prussia withdrew from the war in 1746, and the peace of Aachen was signed in 1748. The peace was in truth but a truce, and restored simply the *status quo*. The period between the end of the war of the Austrian Succession and the outbreak of the Seven Years' War was filled with dissensions and troubles in F. itself. The minister, Machault, attempted to break down class privileges, but failed. The power of the Church and of the nobles was increased, and it was only war that saved F. from revolution. By 1756 India had practically been lost by the recall of Dupleix, and war was going on in America even whilst the two countries were formally supposed to be at peace. In 1756 was accomplished that diplomatic revolution which united the interests of the Hapsburgs and Bourbons, and opposed them to England and Prussia. Such was the state of affairs when the Seven Years' War broke out. The Fr. were successful in Europe and America up to 1758, but during 1759 the series of victories at Lagos, Quiberon Bay, and the Heights of Abraham (Canada) brought the power of F. down to the lowest level it had reached. Their power in India was overthrown by the surrender of Pondicherry, and although the war dragged on until 1763, Fr. power was broken. In Europe she had been almost equally unsuccessful, and the

great victory at Rossbach broke the military power of F. until the Revolution. By the treaty of Paris F. ceded Canada and N. America to England. She regained her trading stations in India, but her power was gone. Minorca passed into British hands, and she had to compensate Spain with Louisiana. The downfall of Fr. military prestige was a great blow to the Fr. monarchy, since that monarchy was based essentially on the victories of the Fr. arms. Between 1763 and 1774 F., under the ministry chiefly of Choiseul, was engaged in internal reform and also in an attempt to raise afresh the strength of the navy for a renewed struggle with British power. At home a struggle was also going on between the Jesuits and the minister, supported by the Parlement de Paris, both of whom held Jansenist views. The Society of Jesus was abolished in F.



LOUIS XVI.

in 1762. F., busy with affairs of W. Europe, had little time to turn to the affairs of the East, where Russia and Turkey were engaged in war, and Russia, Austria, and Prussia were engaged in the first partition of Poland (1772). F. maintained her alliance with both Austria and Spain, and in 1770 Marie Antoinette, Archduchess of Austria, married the Dauphin. Before the end of the reign (1774) Choiseul had been dismissed, and F. left in a weakened state, the monarchy was weakened, the nobility privileged and hated, whilst the Church was distrusted and disliked. It remained now only for Louis XVI. (1774-93) to attempt reforms, and finally, with the best of intentions, to call the States-general (1789). The influence of Marie Antoinette during this period was pernicious in the ex-

treme. She was stronger-minded than her husband and influenced policy considerably. The well-intentioned reforms of Turgot were frustrated by her, whilst Necker was dismissed in 1781, after having attempted to manage the finances of the country for six years. During the American War of Independence F. supported the colonies. Her minister, Vergennes, was an able administrator, and directed her policy with such effect that her intervention won the Americans recognition of their independence, and restored to F. much of the prestige that she had lost at the close of the Seven Years' War. The Fr. navy for a time were supreme at sea, and Eng. power sank lower than it had for some considerable time. The American war has rightly been described as F.'s revenge for the loss of Canada.

After this war, however, F. was too busily engaged at home to be of importance in European politics. Her ministers tried various means of reform, but finally public opinion in F. became so strong that the king was obliged to call the States-general for May 1789, and to restore Necker as his minister. The literary influences which had worked to bring about the Revolution were many. The reign of Louis XV. had but emphasised the mistakes of the policy of Louis XIV.; the privileges which still remained to the nobility had brought about an intense personal feeling between the classes; and the intervention in the American war had led to the propagation of republican and revolutionary ideas. To all these influences were added the writings of Montesquieu, the encyclopédistes, Voltaire, and Rousseau. The writings of these men had concentrated public opinion on the feudal abuses of F., and, most important of all, the *Contrat Social* of Rousseau had been widely read and had widely interested the people of F. The States-general met on May 5, 1789. The Third Estate immediately demanded that the Assembly should meet together and not in its three orders. In June they adopted the title of the National Assembly, and opposed by the nobles and ordered by the king to dissolve, refused, and banded themselves together by an oath to make a new constitution for F. Events moved with startling rapidity. The king, unnerved by the tendency of events, concentrated his troops round Paris. Mirabeau demanded the disbandment of the troops; the king refused, and dismissed Necker; the National Guard was formed by the people, and the Bastille stormed and taken (July 14). The fall of the Bastille led to the re-

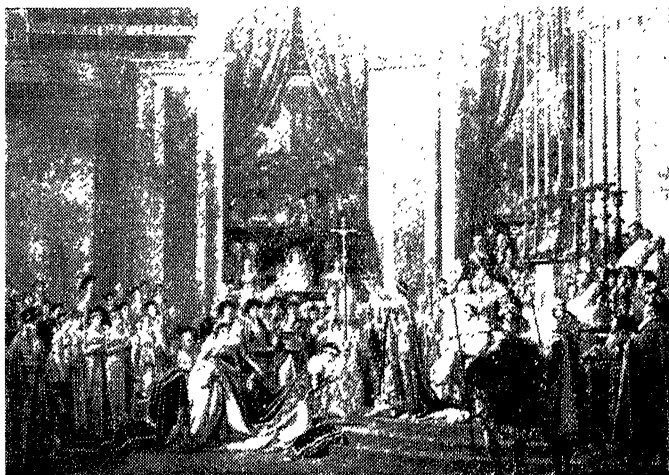
call of Necker, whilst all over the country it influenced the formation of national guards and attacks on the castles of the feudal nobility. The Assembly now debated the Rights of Man, and proceeded to abolish all feudal privileges, but it also wasted much time. The gov. was to be by means of a single chamber, and the royal veto was only potent for six months. In Oct. the Assembly moved to Paris, whither the king had been conducted by the mob. The leader of the Assembly, Mirabeau, was by his own personality able to prevent many of the excesses of the revolutionaries. In 1790 he became, however, a secret adviser of the king, whilst in 1791 he died. When he died all chance of a comparatively peaceful settlement died also. In June the king attempted to flee the country, but was captured at Varennes and brought back. Still the revolutionaries were in the minority, and a slight reaction in favour of the king set in. In 1791 a new constitution was promulgated. The country was divided into eighty-three departments, to be ruled over by authorities who were to be elected; the judges were also elected; whilst a schism was caused in the Church by making the offices of the clergy elective also. The Assembly then passed a self-denying ordinance and dissolved itself (Sept. 1791). The new Assembly met in Oct. It was composed chiefly of Girondists (the Moderate party) and Jacobins (or Extremists), led by Robespierre, Danton, and Marat. The question of the action of the *émigrés*, as the nobles who had fled the country were called in Austria and Prussia, led, after the death of the Emperor Leopold, to the declaration of war with Austria (1792). The ill-success of the Fr. arms at the beginning of the war infuriated the mob, who on Aug. 10 stormed the Royal Palace, slaughtered the Swiss Guards, and overthrew the monarchy. A new ministry at once came into office, the war was pursued with more vigour, and Dumouriez won the battle of Valmy (Sept. 20). The National Convention declared F. a republic, and Gemappes overthrew the Austrians. The Fr. people now called upon the nations of Europe to rise against their own rulers, and declared themselves the friends of all peoples and the enemies of all governments; they also declared the Scheldt open, and annexed the Austrian Netherlands. European war was imminent. England had up to this time taken no active part in the affairs of F., but the policy of F. was irritating and wearying, and in Feb. 1792 F. declared war against England and Holland. F.

now found herself opposed by Spain, Portugal, and Austria, together with England and Holland. The Girondists and Jacobins were quarrelling amongst themselves. The Sep. massacres of 1792, the work of the Jacobins, were condemned by the Girondists, who, however, were finally out-voted by the Jacobins, who tried and executed Louis XVI. (January 1793). In the same year the Girondists were overthrown, and the Committee of Public Safety was instituted. The attempts to raise soldiers for the Republican armies led to the revolt of La Vendée, and finally, by means of the great Committee of Public Safety (July 1793), and the institution of a Reign of Terror, F. for the time being fell under the sway of the Jacobins. The Jacobin policy was successful both at home and abroad. La Vendée was crushed, the allies were overthrown, and F. was free from invasion; but the Jacobins quarrelled amongst themselves, and finally, in 1794, after having instituted the Age of Reason, abolished religion, and set up a new calendar, Robespierre himself was guillotined. After the death of Robespierre affairs in F. quietened down; the foreign policy remained successful; Spain and Prussia withdrew from the war, leaving England and Austria as the chief powers opposed to F. Finally, in 1795, the Directory was formed. This was the first attempt to set up a reactionary government.

The Gov., opposed by the forces of the Moderate as well as the Extremist party, was faced with another revolution. When putting down the insurrections by means of Napoleon's famous 'whiff of grapeshot,' it established the constitution of the year III., and set up a republican form of gov., which consisted of fifty Directors and two Councils. This constitution was weak, since there were no means of compelling harmony between the Directory and the Councils. The policy of the Directory was successful both at home and abroad; the reaction of the Royalists, who were in the majority in the Councils, was put down, and the Italian campaign ended in the peace of Campo Formio (1797). England was now left alone to fight F. Napoleon now left Europe to fight in Egypt; his campaign there is given in more detail elsewhere (see NAPOLEON I.). When he returned he found that a second coalition had been formed against F., and the Fr. had been driven out of Italy. But the Directory had failed hopelessly, and F. was on the verge of civil war when Napoleon, aided by Sieyès and Barras, carried out the

revolution of 19 Brumaire (1799), destroyed the Directory, and set up the consulate. Napoleon established himself as first consul, and then undertook the Italian campaign, where, by the victories of Marengo and Hohenlinden, he forced Austria to accept the Peace of Lunéville (1801). The armed neutrality of the N. was initiated to overthrow the power of Britain; but even this failed, whilst the Danish fleet was destroyed at the Battle of Copenhagen, and the accession of Alexander I. withdrew the Russians from their Fr. alliance. England

(A more detailed account of the campaigns of the time will be found under NAPOLEON I.) In every country which Napoleon attacked national spirit was aroused, and before this he ultimately fell. In Spain, in Russia, in Ger., the cause and the result are similar. Further, the inability of Napoleon to gain mastery of the seas accounted for his inability to overthrow successfully the power of Britain. Trafalgar was fought in Oct. and Austerlitz in Dec. 1805; Austria was forced to make peace at Presburg (1805); Ger. was split



THE CORONATION OF NAPOLEON (1804)

(David)

[Louvre]

and F. made peace by the Treaty of Amiens, but it was recognised on both hands that the treaty was but a truce. During the short interval of peace Napoleon did much to restore order and prosperity in F. He reorganised the central Gov., established a good system of education, and healed the schism in the Church by his famous concordat with the papacy. He also reduced the Fr. law to order by means of the famous Code Napoléon. F. seemed in a fair way to recovery. In 1804 Napoleon, who had narrowly escaped assassination, was declared Emperor by the Senate, and crowned himself at Notre Dame. In 1804 the war broke out anew, and the life of Napoleon is the history of Europe.

up and divided into states such as the confederacy of the Rhine; Prussia was destroyed at Jena and Auerstädt; and Russia reduced to terms by the victories at Eylau and Friedland (Treaty of Tilsit, 1807). Napoleon, by means of the Continental System, tried to overthrow the power of Britain, but ultimately failed, because he saw that he could not do without British supplies himself (see CONTINENTAL SYSTEM). The interference in Spain and the campaign into Russia were two vast mistakes, and finally, when Napoleon emerged from the Russian campaign, he was plunged into the War of Liberation (1813). The battle of the nations (Oct. 16-18, 1813) saw Napoleon's forces utterly defeated

by a combination of Gers., Austrians, and Russians. Still Napoleon refused to make peace, and finally the allies entered F. from the N., whilst Wellington routed the Fr. in the S., and proclaimed Louis XVIII. Napoleon abdicated, and was exiled to Elba, whilst the first Treaty of Paris was signed (1814). The settlement of Europe was still under discussion when Napoleon escaped from Elba, landed in F., and rallied the Fr. around him. The campaign known as the Hundred Days took place, and Napoleon, finally defeated at Waterloo (June 18, 1815), abdicated, surrendered to the Eng., and was exiled to St. Helena, where he died in 1821. F. was granted civil and religious liberty, and settled down for a time under the gov. of Louis XVIII. On the whole, the system of gov. had been improved by Napoleon, but the Revolution was not yet fully understood. Almost immediately there was a Royalist reaction in F., but for a time liberal ideas carried all before them. In 1820 the murder of the Duc de Berri, however, swung the pendulum in favour of the Royalists, who remained in power practically until the Revolution of 1830. The reactionary ordinances of Charles X. led to the revolution of July, and the Bourbon monarchy fell in F. for ever. Louis Philippe was declared king of F., and the policy of the Fr. Ministry under him was most liberal in tendency. England, F., Spain and Portugal united together in the Quadruple Alliance, which was brought to a close by the Near Eastern problem, in which Thiers, whilst nominally allied to Britain, worked against her interests in the Mediterranean.

Guizot succeeded Thiers, and remained in office until 1848. His policy was shifty and weak, and although he acquired Algeria, he did much to foster bad feeling between England and F. The question of the marriage of the Queen of Spain brought open rupture between the two countries, and Fr. found herself practically isolated in Europe. The party of reaction was overthrown by the revolution of 1848, when Louis Philippe abdicated, and a republic was set up. An attempt at establishing a constitution on a communistic base failed, and finally a constitution which gave universal suffrage and a president elected by the people was established. Prince Louis Napoleon was elected President (1848). In 1851 Napoleon carried out his *coup d'état*. Paris was overawed by soldiers and Napoleon's opponents were arrested. A new constitution was issued. The

President was to be elected for ten years; there was to be a Senate (nominated by the President), and a Legislative Council (elected by the people). These changes received the sanction of the majority of the people of F., and were carried out. In 1852 Napoleon III. re-established the empire and proclaimed himself emperor. Better relations were almost immediately established between England and F., in view of the affairs of the Near East, where Russia was attempting to establish a supremacy. In 1854 England and F. in alliance fought the Crimean War against Russia. In 1856 the treaty of Paris ended the war, and declared the Danube free and the Black Sea closed to warships, but nevertheless neutral. Turkey was to carry out various reforms, but the most important result was the prestige which it gave Napoleon. F. was rapidly becoming more prosperous. But there was still much opposition to Napoleon from the Republicans, and this opposition was met by repressive measures which really weakened Napoleon's power. In 1858 he went to war in alliance with Italy against Austria, but having defeated the Austrians at Solferino he withdrew from the alliance and made peace, leaving the question of Italian unity to be settled later by Cavour and Garibaldi. Napoleon now made many mistakes. His policy in Mexico met with worse than disaster, whilst his attempts to establish Fr. power in the Far East were equally unsuccessful. The Prussian-Austrian War was viewed at first with equanimity by Napoleon, but the victory of Prussia and the knowledge that Ger. unity was a probability of the near future, filled him with dismay. His demand for Luxemburg and Belgium nearly led to war, and certainly did much to discredit him (1867). F. was again isolated in Europe. The succession question in Spain and the putting forward of a candidate of the house of Hohenzollern (who was, however, speedily withdrawn) led to the Franco-Prussian War. The Fr. were unprepared, and after gaining a small victory were defeated at Worth and Sedan, when Napoleon III. was taken prisoner. The empire in France fell, and under the gov. of National Defence tried to oppose the Gers. Metz, however, where Bazaine was holding out with 170,000 men, surrendered, and Paris was besieged. In 1871 Paris capitulated, and peace was signed. A huge war indemnity was demanded, and Alsace and Eastern Lorraine ceded. The Commune was set up in Paris, and the provincial government under Thiers had difficulty in obtaining possession of that

city. For the next two years Thiers ruled F., and succeeded in establishing order and restoring the finances. Much quarrelling ensued, however, as to the constitution which F. ought to adopt, and Thiers was driven by opposition from a conservative position to an extremist one, and was then driven from power (1873). He was succeeded by MacMahon. The period of the Third Republic was definitely inaugurated by the decree of Jan. 1875, which organised the Republic under what is called the Constitution of 1875. MacMahon, however, was conservative and Bonapartist in sympathy. In 1879 he was forced to submit to Republican opinion, and was succeeded by Grévy. The Republican Party after this victory split into divergent groups—the Democratic Liberals, the Radicals led by Gambetta, and the Radical-Socialists of whom Clemenceau was spokesman. In opposition the Monarchists, Bonapartists and Clericals formed a coalition, and exploited the ambition of General Boulanger (*q.v.*) to overthrow the Republic. Grévy resigned in 1887, and was replaced by Carnot. Boulanger was charged with high treason, and fled. The Moderate Republican party hoped for the support of the Catholics, but Gov. prestige was weakened by the scandal connected with the bankruptcy of the Panama Co., 1893. Meanwhile, Socialism was becoming an organised force, and Jaurès was elected to Parlement in 1893. In the next year Carnot was assassinated by an anarchist. A wave of anti-Jewish feeling surged over F. during the Dreyfus Affair, 1897–1900, which acquired so great a political significance that the very stability of the Republic was threatened, while the influence of the Army became well-nigh supreme. (See DREYFUS AFFAIR.) The Waldeck-Rousseau Ministry settled this affair with Loubet as President in succession to Faure, the anti-Dreyfusard. The next problem confronting Waldeck-Rousseau and his successor, Combe, was that of the Church, and resulted in 1905 in the separation of Church and State. The Royalist party no longer counted in Fr. politics, but its ideals were perpetuated by Charles Maurras in his newspaper, *L'Action Française*. He endeavoured to enlist Catholic support and inaugurated a movement which gathered strength after the Great War, until finally repudiated by Pope Pius X. in 1926.

One feature of pre-war Fr. politics was the growth of syndicalism, especially within the *Confédération Générale du Travail*, formed in 1895. The Clemenceau Ministry of 1906 was

faced with extreme labour troubles, and fell in 1909, a new Cabinet being formed by Briand (*q.v.*), who continued in office until the elections of 1910. Fr. foreign policy to this date had been one of colonial expansion, which in Tunis provoked a dispute with Italy (1881–3), in the Congo, and in Egypt with England, especially the Fashoda (*q.v.*) Incident in 1898, and in Morocco with Ger. in 1905 and 1911. The conquest of Tunisia caused Italy to form the Triple Alliance with Ger. and Austria (May 1882), and this was countered by the dual alliance between F. and Russia in 1881. Fr. politics in the early twentieth century were divided over reconciliation with Ger., advocated by Caillaux, or *rapprochement* with England. The latter policy, supported by Clemenceau, resulted in the Entente Cordiale between F. and England (1904). The Agadir incident of 1911, which F. regarded as an attempt to establish Ger. influence in a Fr. sphere, nearly led to the outbreak of hostilities, which, however, the Triple Entente succeeded in avoiding. The elections of 1910 had been fought over Proportional Representation, and electoral reform was accepted by the Caillaux Cabinet of 1911, Briand having been forced into retirement by Socialist opposition. In 1912 Caillaux was defeated over his policy of reconciliation with Ger., and in opposition a Poincaré Ministry was formed. In 1913, however, Poincaré was elected president in succession to Fallières, who retired at the end of his period of office (Feb. 1913). The first ministry under the new president was formed by M. Briand. After Briand resigned the same year over the issue of Proportional Representation, his successor, Barthou, introduced a scheme of restoring a third year of military service. The Barthou Ministry fell as soon as the scheme became law, but the repeal of the law by Viviani, who formed a Radical Ministry, was prevented by the outbreak of the Great War. (See EUROPE; WAR, THE GREAT.) The prospect of war found F. neither morally nor materially ready for war. The elections of 1914 had been fought over the issue of three years' service, and public attention was diverted by the political murder of Calmette (*q.v.*), March 16, 1914. In the army, estimated at peace strength of 654,000 men, there was considerable discontent over the increase of military service, but the measure was justified by the Ger. Army Bill of June 1913, which raised the peace strength of the Ger. army to 870,000 men. With the Austro-Serbian crisis and the murder

of the Archduke Ferdinand (*see* FRANCIS FERDINAND) at Serajevo on June 28, 1914, war became imminent. President Poincaré visited the Tsar Nicholas II. at St. Petersburg in July, and immediately after his return Austria presented Serbia with an ultimatum which was followed by a declaration of war on July 28. The Ger. Emperor, Wilhelm II., and the Tsar Nicholas exchanged telegrams, expressing the wish to localise the Serbian conflict. Russia had been forced into partial mobilisation by Austria's attitude, and Ger. demanded Russia's complete demobilisation without putting similar pressure on Austria. Russia refused, and Ger. declared war on Russia on Aug. 1. F. had waited upon Russia's decision, but had partly mobilised the Fr. troops at a distance of 10 km. from the frontier. The Ger. mobilisation was directed against F. and Ger. declared war on Aug. 3. England had been unable to announce 'solidarity' with F. and Russia over the Serbian question, but Grey (*see* GREY OF FALLODON, LORD), the Eng. Foreign Minister, had made strenuous efforts at mediation, at the same time promising F. naval support in defending the N. coast. The Ger. invasion of Belgium caused England to declare war on Ger. on Aug. 4. The Fr., who had organised their defensive on the Lorraine frontier between Ger. and F., were not prepared for the violation of the neutrality of both Belgium and Luxembourg. The nineteen Ger. army corps were grouped into seven armies: three advanced through central Belgium, two through Luxembourg and S.E. Belgium, and two were stationed in Lorraine. The Ger. concentration on the Western Front amounted to seventy-two divs., of which twenty-eight were in reserve, and ten divisions of cavalry. The Fr. forces, commanded by General Joffre, numbered seventy divs, of which twenty-five were in reserve, two colonial divs., ten cavalry and twelve territorial divs. The Fr. mobilisation numbered 3,781,000 men, and of these 157,000 were in N. Africa and 935,000 in the interior. Joffre, however, was unable to give any material assistance to Belgium, although a counter-offensive was launched in Lorraine under General Pau. (For military operations, *see* FRANCE AND FLANDERS, GREAT WAR, CAMPAIGNS IN; WAR, THE GREAT.) In Paris a truce was called to party politics by a '*Union Sacrée*,' and Viviani enlarged and reconstructed his Cabinet. Millerand became Minister of War, Ribot of Finance, while Delcassé, whose policy of alliance was justified by the war, returned to the Foreign Office. The

Cabinet also included two Socialists, Guesde and Sembat.

Paris was threatened by the Ger. advance, and on Sept. 2 the gov. withdrew to Bordeaux. General Gallieni (*q.v.*), military governor, was left in control of Paris, and by despatching the 'army of Paris' to the front in taxicabs he contributed to Joffre's success in the Battle of the Marne (Sept. 5-12). The history of F. for the next four years is essentially that of the war. The patient resistance of the Fr. people was stiffened by the Ger. destruction of Rheims Cathedral and the devastation of Fr. territory. Fr. industries were concentrated in the N. and N.E., and the Ger. occupation crippled their activity. 83 per cent. of the foundries, 80 per cent. of the looms, 60 per cent. of the cotton spindles were lost to F., and 70 per cent. of the sugar industry was in the occupied territory. Nearly all the iron and half the coal resources were also under Ger. control, but F. developed her industries in the unoccupied regions with amazing energy, and the effect of this decentralisation of industry is permanent. In Dec. the Fr. Gov. returned to Paris. Negotiations were pushed forward with Italy, which had declared neutrality at the outbreak of the war. Italy, although a member of the Triple Alliance, had already by secret Accords (1900 and 1902) agreed not to attack F. in the event of a Ger. invasion, and Ger. by taking the aggressive in 1914 relieved Italy of her obligations under the Triple Alliance. The Treaty of London, April 26, 1915, brought Italy into the war on the side of the Entente. In Oct. Delcassé, the Foreign Minister, resigned, as he no longer supported the proposed expedition to Salonika, owing to the hostility in Greece to the policy of Venizelos. The fall of the Viviani Ministry followed upon the failure of Allied diplomacy in the Balkans, and on Oct. 28 a new Ministry was formed by Briand. General Gallieni succeeded Millerand (*q.v.*) as Minister of War. In June 1916 Briand opened the Allied Economic Conference at Paris, at which was determined the policy of economically outlawing the Central Powers in the event of an Allied victory. The Briand Cabinet was reorganised in Dec., and the Ger. peace proposals at that time were scornfully rejected. General Lyautey became Minister of War, but resigned in March 1917. Under a new Ministry formed by Ribot, who succeeded Briand, Painlevé was made Minister of War. Painlevé continued the Balkan policy of supporting Venizelos (*q.v.*). In Sept. he could not re-

construct the Cabinet owing to the refusal of the Socialists to co-operate, as they had been forbidden passports to the International Conference at Stockholm. Malvy (*q.v.*), the Minister of the Interior under Ribot, nevertheless encouraged the Socialists who agitated for peace by negotiation. Clemenceau's criticism caused Malvy to resign, and in Sept. the whole Cabinet was reorganised, Painlevé becoming Premier. Defeatism at this time was assuming serious proportions, being encouraged by Duval, editor of the *Bonnet Rouge* (*q.v.*) newspaper, by Humbert, owner of the *Paris Journal*, and by Bolo Pasha (*q.v.*), financier and adventurer. The scandal that these men, and more especially



POINCARÉ

Caillaux (*q.v.*), former Premier of F., were in the pay of the Gers., brought about the fall of the Painlevé Gov. on Nov. 16, 1917, and Clemenceau was invited to become Premier and Minister of War. Energetically he fought defeatism. Malvy was exiled. Bolo Pasha and others were arrested and condemned. In Jan. 1918 Caillaux was arrested and imprisoned. Clemenceau became virtual dictator, and his dictatorship did not end until after the Peace Conference at Versailles, over which he presided. (See CLEMENCEAU.) By the Treaty of Versailles, June 28, 1919, F. recovered Alsace-Lorraine (*q.v.*), but failed in the desire to fix the Rhine as the Ger. frontier, although the Rhineland was to be occupied by Fr. and Allied troops for fifteen years. F. was also given a mandate for Syria,

and, in addition, acquired Togoland and part of the Ger. Cameroons (*q.v.*), but her claims in Cilicia (*q.v.*) she abandoned to the Turkish Nationalist Gov. With the Fr. realisation that the Treaty was giving them neither the security nor the reparations on which they had counted, Clemenceau became unpopular, and in the 1919 elections he was superseded by Millerand, who formed a Conservative *Bloc National*. Moreover, not Clemenceau, but Deschanel was elected to the Presidency when Poincaré retired in 1920. At the Conference of San Remo (April 1920) and Spa (July 1920) Millerand was chiefly concerned with maintaining the supremacy of F. His policy was also to support Poland as a buffer state against both Ger. and Russia. He gave Poland military aid against the Bolsheviks and saved Warsaw. When Deschanel fell ill, Millerand was elected President. Leygues became Premier for a short time, but at the beginning of 1921 he was succeeded by Briand. (See BRIAND.)

The problem before Fr. statesmen was that of the reconstruction of F., and it was hoped to effect this by making Ger. pay, as Ger. had made F. pay in 1871. Out of a total of 7,500,000, Fr. casualties numbered 1,506,600 (*i.e.* 1,385,300 dead, 2,675,000 wounded, and 446,300 missing). One-tenth of the country had been laid waste. In the war area 300,000 private houses and 6000 public buildings were destroyed, together with 20,000 industrial establishments. 2400 km. of railway and 50,000 km. of road were ruined, while over 2,000,000 people had been forced to flee their homes. The cost of reconstruction was reckoned at about £250,000,000. The Fr. immediately after the war had exaggerated ideas of the amount that Ger. would be able to pay. At the Paris Conference of 1921 the amount to be paid was reduced to 226 milliard gold marks. Owing to Germany's default in payment, Briand initiated the method of territorial sanctions. The British Gov. supported him, and Dusseldorf, Duisbourg, and Ruhrort were occupied. Loucheur, Briand's chief adviser, was attempting to compromise with Rathenau, the Ger. representative at the Conference of Cannes (Jan. 1922), at which reparations were discussed. (See REPARATIONS.) An Anglo-French Treaty guaranteeing British aid in the event of Ger. aggression against F. was put forward by Lloyd George, but rejected by Briand as humiliating, there being no mention of a reciprocal obligation of F. to support England. In 1919, as compensation for the Fr. Rhine

frontier policy, a similar treaty had been drawn up by F. with Great Britain and the U.S.A., but was never ratified. Briand was recalled to Paris on Jan. 11, 1922, on the assumption that he was not protecting Fr. interests, and, being deposed from power, he was succeeded by Poincaré, who had stimulated the conviction in F. that Ger. should be made to fulfil her Treaty obligations to the letter. At the London Conference (Aug. 1922) he demanded 'productive guarantees' as a condition for allowing Ger. a moratorium. These guarantees included the exploitation of the Ruhr. In Nov. Lloyd George was succeeded as Prime Minister by Bonar Law, who went to Paris in Jan. 1923, with an offer of a four years' moratorium, involving some British concessions, but it was too late. The Reparations Commission had granted a moratorium which had elapsed on Aug. 31, 1922, and Ger. became liable to pay 500 million gold marks on Jan. 15, 1923. On Jan. 11 Fr. and Belgian troops were moved from Dusseldorf to Essen. (For the Fr. occupation of the Ruhr see under RUHR.) In the elections of 1924 Poincaré was defeated over the financial question. To prevent the downfall of the franc he had been compelled to demand an increase of taxation, and on this issue was defeated by the Radicals and Socialists. The *Bloc National* gave way to a *Bloc des Gauches*, with Herriot (*q.v.*) at its head. Poincaré's retirement rendered Millerand's position as President untenable; on June 11 he resigned, and was succeeded by Gaston Doumergue, who, in 1931, was followed by Doumer. Herriot, the new Premier, found himself in agreement with MacDonald, Prime Minister of England, and the Entente Cordiale was re-established. At the London Conference July 16, 1924, the Dawes Plan (*q.v.*) was accepted. In Aug. a ministerial crisis was averted in F., and Herriot gained the consent of the Minister of War and of Marshal Foch to a military evacuation of the Ruhr within twelve months. The evacuation was completed by July 31, 1925. Herriot played a foremost part in the framing of the Geneva Protocol (*q.v.*) at the League of Nations assembly in Sept. 1924, and although the Protocol was not ratified, it led the way to the Locarno Pact, which was negotiated during 1925, by Briand, Fr. Foreign Minister, with Austen Chamberlain and Stresemann. The Locarno Treaties (*q.v.*) were concluded on Oct. 16, 1925, and the final date of signature was fixed for Dec. 1, in London.

Although the Herriot Ministry brought a new spirit into international

affairs, it was forced to resign over the financial question. Seven finance ministers had succeeded each other in eighteen months, and Caillaux, who became Minister of Finance in July 1926, attempted to raise taxation, but was deserted by his Radical supporters. The Radical Bloc resigned, and with the suspension of party feuds Poincaré formed a ministry to stabilise the franc. He instituted sweeping reforms, closing 227 local courts, 218 local prisons, and 153 local treasury offices, and abolishing the positions of 2700 officers in the army. He set up an Autonomous Fund Commission to deal with the floating debt, and in 1926 the Budget was balanced for the first time since 1913. The value of the franc was increased by 100 per cent. and fluctuations were prevented. In Oct. 1927 the Radical Socialist Party withdrew its support of the Gov., but in the April elections the following year the Poincaré Ministry was returned to office with an increased majority. During these elections the supporters of Alsatian autonomy gained some ground. There were fears in Alsace-Lorraine that the centralised Fr. Gov. would interfere with the educational and religious conduct of the provinces which were strongly Catholic, but Poincaré gave assurances to the contrary. (See ALSACE-LORRAINE.) In domestic affairs the Poincaré Cabinet withstood repeated attacks from the Radical Socialists, while in foreign affairs the Briand-Kellogg Pact was concluded in Aug. 1928 (see KELLOGG PACT), and the following year Poincaré secured ratification of the Young Plan together with the Churchill-Caillaux Accord with England and the Mellon-Béranger Accord with the U.S.A. in respect of the Fr. debts. On July 26 Poincaré resigned through ill-health, and Briand continued as Premier of the Poincaré Cabinet until defeated in Oct. Briand had been forced to make concessions to England at The Hague Conference in Aug., and had agreed to the evacuation of the Rhineland before the proposed Fr. Eastern frontier fortifications were begun. Briand, however, remained as Foreign Minister in the new Gov. formed by André Tardieu. The defeat of Briand by Doumer for the presidency was regarded in Germany as a rebuff for the policy of disarmament, but, on the other hand, Fr. electoral methods do not necessarily reflect the opinion of the country.

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France and Flanders, Great War Campaigns in.

1914

German Invasion of Belgium.—Preparations for a war between France and Germany had been actively made for many years before the actual outbreak in 1914. Germany's plan provided for a swift defeat of France which would enable her to transfer an adequate number of troops to her Eastern Front and overwhelm Russia whilst that country was still in process of mobilisation. The destruction of the Fr. forces was to be accomplished by the envelopment of their left flank and, as this would probably require the passage of a large force through Belgium, the violation of that country's neutrality (of which Germany herself was one of the guarantors) was duly provided for in Germany's plan. Such were the military factors which operated to make France and Flanders the 'Western Front' during the Great War.

Germany declared war on France on Aug. 3, 1914, and it being early evident that the Gers. would violate Belgian neutrality, the Belgian army was deployed to resist the invasion. On Aug. 4 Ger. troops crossed the border into Belgium and commenced an attack on the fortresses of Liège. This violation caused Great Britain to declare war on Germany, and the British mobilisation was ordered at once. General von Emmich (*q.v.*) was in command of the Ger. invading force, the Belgians being under the command of General Leman. The Gers. could make little progress against the Belgians until they brought up their heavy howitzers. These quickly pounded the fortifications, which were unprepared for projectiles of such weight (see FORTIFICATIONS). Nevertheless, the re-

tarding effect on the Ger. force destined to envelop the Fr. left wing of the gallant Belgian defence contributed in no small measure to the eventual success of the Allies' cause in that it gave Great Britain time to transport her army to France and take up its position on the left of the Fr. line near Mons. By the third week in Aug. the Ger. Armies had overcome the Belgian obstruction and pouring through, unopposed, were threatening the Fr. left. Whilst the operations in Belgium were in progress, the Fr. and Ger. Armies had deployed facing each other along the frontier. As a set-off against the Ger. advance on his left wing, Marshal Joffre (*q.v.*), the Fr. Commander-in-Chief, tried on Aug. 20 to penetrate the Ger. line on his right flank, about Sarrebourg and Morhange. The Fr. were defeated with heavy loss and driven back to the frontier. About the same time the 5th Fr. Army, under Lanrezac, also sustained defeat at the hands of von Bülow (*q.v.*) commanding the 2nd Ger. Army at Charleroi.

Von Kluck's Enveloping Manœuvre.—With Metz as the pivot, the whole of the Ger. right wing was now making a great sweeping movement to envelop the Fr. left. As soon as Belgian opposition had been disposed of, the 1st Ger. Army, under von Kluck (*q.v.*), advanced rapidly and, by Aug. 23, was in a position which imposed a hasty retreat on the Allied left wing to enable it to escape attack by overwhelming odds. At this time, however, thanks to the Allies' counter-espionage service, von Kluck was unaware that the British Expeditionary Force (B.E.F., *q.v.*) under the command of General Sir John French was in position on the Fr. left; nor was this fact known at Ger. G.H.Q., where all were watching with feverish excitement and premature joy the success of their plan as represented by von Kluck's movements. The B.E.F. was actually in the perilous position of having both its flanks exposed to an overwhelming adversary; for not only was von Kluck threatening its left, but, owing to the retreat of Lanrezac's Army, under pressure by Bülow and Haussen, its right was also 'in the air.' Notwithstanding these difficulties, the British 2nd Corps, under General Sir Horace Smith-Dorrien, faced the Gers. at Le Cateau (*q.v.*) on Aug. 26, and not only held up von Kluck's victorious march, but also inflicted great loss on the Gers. A few days later Lanrezac checked von Kluck at Guise, but the vast superiority in numbers of the Gers. compelled the

B.E.F. and Lanrezac's 5th Army to retreat rapidly to avoid annihilation—a movement which exposed Joffre's left wing to attack. In order to avert this threat, Joffre threw back the whole of his line from Nancy to the left, and created a new army under General Maunoury on the extreme left about Paris.

One of the decisive features of the war occurred when von Kluck's right flank reached the R. Somme about Amiens. Being under the impression that the B.E.F. had been annihilated, and in ignorance of Maunoury's new army about Paris, he changed his direction from practically S.W. to S., in order to envelop the Fr. left wing. When he arrived at the R. Oise he again changed to S.E., thereby leaving Paris some miles away on his right flank, which was exposed to attack by Maunoury and the troops of the Paris defences. As the envelopment of the Fr. left was now regarded as a certainty, the Gers. endeavoured to 'roll up' the right flank also and thus complete the destruction of the entire Fr. army. To this end Prince Rupprecht tried to break through at Nancy but was heavily repulsed.

Battle of the Marne.—During the preceding few days, Joffre had also formed another army under Foch, also towards his left flank, to fill up the gap in the retreating Fr. armies. Joffre now waited until von Kluck had crossed the R. Marne, and then gave the famous order for a counter-offensive to begin on Sept. 6. Maunoury, whose 6th Army had been rushed to the front in vast numbers of taxi-cabs and every other kind of vehicle, attacked von Kluck on his flank and rear, and forced him to recross the Marne precipitately and to face west to meet this unexpected assailant. Foch held up von Bulow and Hausen. On Sept. 8 the B.E.F. pressed forward towards the Marne (see MARNE, BATTLE OF THE) in the gap between von Kluck and von Bulow, compelling the latter to retreat towards the Aisne. Von Kluck was ordered to conform to Bulow's movements, for otherwise he would have been completely isolated. This retreat was the deathblow to Ger. hopes of enveloping the Fr. armies. Eminent authorities on both sides consider these the most fateful days of the war, and it seems extraordinary that, although the Gers. were always given the greatest credit for possessing a wonderful organisation for espionage, they knew nothing concerning the two most important features which led to the frustration of their plans in these days, viz.

the presence of the B.E.F. at Mons and the formation of Maunoury's army on their right flank.

During these early movements in the Great War the direction of the Ger. armies was under General von Moltke, Chief of the General Staff; but his weakening of the Ger. right wing (by withdrawing from it troops to go to E. Prussia) before it had completed its task proved that he was not equal to the great name he had inherited, and he was removed from his appointment and succeeded by General von Falkenhayn (*q.v.*).

Although the Ger. invasion had been arrested and their right wing forced back, on the remainder of the front their line seemed immovable. The Belgian army was still holding out at Antwerp (*q.v.*), to which town it had withdrawn after the fall of Liège, and being in rear of the Ger. right, was, although small, a force to be reckoned with as calculated to interfere with the Ger. communications. It therefore imposed upon the Gers. the necessity of detaching a force sufficient to guard against any offensive action it might be capable of taking. During its occupation of Antwerp the Belgian army was reinforced by British Naval and Royal Marine brigades. The town fell on Oct. 9; the British garrison reached Ostend, where it embarked for England, and the remnant of the Belgian army escaped along the coast and eventually joined some Fr. marines holding the Yser at Nieuport.

The Race to the Sea—First B. of Ypres.—The Gers. having been pushed back on his left, Joffre now intended to carry his counter-offensive round their opposite flank, but the Gers. countered this by bringing up reserves which completed the line to the sea. They also planned a 'break-through' in N. France in order to gain the Channel Ports (*q.v.*), which would provide submarine and aircraft bases within easy striking distance of England. The Allies' line in this region was also strengthened, while offensive operations to test the strength of their opponents were maintained by both sides until Oct. 9, when the Gers. began the First Battle of Ypres. This battle continued until Oct. 31, when the Gers. made a supreme effort to break through at Gheluvelt. Here the Allied line was strung out to breaking point, but the situation was saved by the Worcestershire Regt., who filled a gap, made by the Gers., and drove them back with great bravery, a feat which drew high praise from Sir John French. Although these

operations, culminating in the first Ypres battle, virtually destroyed the élite of the Ger. army, they also saw the end of the original B.E.F., the world-famed 'Contemptible Little Army.'

1915

Trench Warfare.—Up to this point the campaign had been conducted on the lines of 'open warfare' or 'war of movement'; but thenceforward it resolved itself into 'trench warfare,' somewhat reminiscent of the Crimean War. During the winter of 1914-15 both sides were occupied in repairing their losses and preparing for the ensuing spring campaign. In Great Britain Lord Kitchener had

period of stalemate during the winter, it achieved little. A month later an Anglo-French attack was made about Ypres, in which the Gers. sprung a surprise by using poison gas for the first time. The gas was a mixture of phosgene and chlorine, the inhalation of which resulted in a painful death. The gases were released from cylinders, and carried to the Allies' lines by a favourable breeze. Later they were enclosed in shells fired by artillery, a method which was clearly in contravention of The Hague Declaration of 1899. On this occasion the troops chiefly affected were the Canadian Division and Fr. Territorial and Colonial troops.



TRENCHES, SHOWING DUCKBOARDS AND BARBED-WIRE ENTANGLEMENTS

become Secretary of State for War, and had begun forming the New Armies, the first of which he intended for despatch to France by the spring of 1915. The Western Front was therefore comparatively 'quiet' after the First Battle of Ypres.

British Attack at Neuve Chapelle.—*Poison Gas Used.*—The successes gained by the Russians on their S. Front against Austria caused Germany to transfer troops from the W. to the E. Front, and this circumstance led Joffre to decide to attack the enemy in Artois (*q.v.*). Sir John French launched an attack against Neuve Chapelle between March 10 and 13, 1915; but beyond improving the morale of the troops, which had been impaired by the

Second Battle of Ypres.—Foch was in charge of the Allied operations in this region, and another offensive was commenced on April 22, lasting until May 25 (known as the Second Battle of Ypres), but it failed to achieve any other result than to inflict enormous casualties on the British forces, owing to their being massed in a sharp salient. The Allied spring offensive proper or general offensive commenced on May 9 with the British attack on the Aubers Ridge. Here the Ger. defences were very formidable and no progress was made. Further S. the British had also commenced the Battle of Festubert (*q.v.*), and although the main objectives were gained, further Allied action was held up by

a shortage of shells, a circumstance which directly led to a political crisis in Great Britain and to the formation of a Ministry of Munitions. In the autumn, further attacks were undertaken for political reasons in Artois, Champagne, and about Loos. These attacks were launched against the definite advice of General Sir Douglas Haig, commanding the First Army (British), there being, in his opinion, not sufficient ammunition available.

The Battle of Loos.—The mining centre of Lens was the final objective of the Loos operations, the main attack of which was along a seven-mile front about La Bassée. It opened on Sept. 25, following an artillery bombardment and a discharge by the British of asphyxiating gas. One of the most violent operations was that connected with the capture of the famous Hohenzollern Redoubt, situated just S.W. of La Bassée. The final result of the battle was that the allied line was advanced to the E. of Loos, thence N. to just W. of Hulloch. The Fr. attack in the Champagne (*q.v.*) was launched on Sept. 25; the Ger. positions were penetrated on a front of about 20 m. between Auberville and Ville-sur-Tourbe. Fighting in this region continued until the end of Nov. These gains in ground, however, were not commensurate with the great losses in men, the British casualties alone, in the Battle of Loos, being 50,000. One of the chief reasons why the Allies obtained no decisive result in this fighting was the lack of available reserves at the critical moment. The year 1915 was, throughout, a black one for the British forces, who suffered over 280,000 casualties. The Fr. losses were not less severe, and it is small wonder that the Allies, as a whole, were in a despondent mood over the result of the year's operations.

Sir John French Superseded.—In Dec. 1915, Sir John French, who had fulfilled his difficult command with no little ability, resigned his appointment, the military authorities being dissatisfied with the progress made, and he was succeeded as Commander-in-Chief by General Sir Douglas Haig (*see* HAIG, EARL). The magnitude of Sir John French's task was, however, enhanced by inadequacy of munitions, the lack of guns of heavy calibre, and the disparity between the numbers of his troops and of those opposed to him. During his command the Fr. military authorities had been responsible for the formulation of plans for the prosecution of the war on the Western Front, the British commander conforming there-

to, and this system was maintained on the change of command. The distribution of British troops was also in the hands of the British authorities as theretofore.

Results of 1915 Campaign.—Generally speaking, the Gers. were on the defensive during 1915, so that in the matter of defensive works and in experience in all things appertaining to defence they were considerably ahead of the Allies at the commencement of 1916. The provision of labour for unskilled work in and behind the lines, was also an important factor; for, whereas the Gers. could call on the Belgians and inhabitants of the occupied Fr. territory to do 'forced' labour in connection with their defences, thereby saving their troops such arduous and monotonous tasks, the Allies employed exclusively military labour, so that their combatant ranks were to a great extent depleted on that account.

In Dec. 1915 an Inter-Allied Conference, presided over by Joffre, passed a resolution to the effect that a decision could be obtained only on those fronts where the greatest number of enemy troops was employed, a resolution inspired by the disastrous termination of the Gallipoli campaign (*q.v.*). The W. Front was naturally one of these, and plans were accordingly made for an Allied offensive on the Somme as soon as the new British Armies (composed of 'service' or Kitchener battalions) were ready to take their place in the line.

1916

Battle of Verdun.—The first operation of consequence in 1916 was the Battle of Verdun (*q.v.*). Von Falkenhayn, giving the reasons for the Ger. attack on this famous fort, states (*see* his *Memoirs*) that in the first place it was hoped to deal an effective blow against England's chief ally, and secondly to improve the Ger. strategical position in this area. His opinion was that, as Verdun was situated at the angle of the Fr. N.-E. and E. frontiers and was less than 12 m. from the Ger. communications, it formed a powerful *point d'appui* for any action of the Allies against those communications; which, if broken, would render untenable the whole Ger. front in France and Belgium. Another important consideration was that such an attack would forestall the Allies' projected attack on the Somme. Twenty-five Divisions were employed by the Gers., but even this colossal force proved insufficient to carry the

forts. The Allies had early intimation of the intended move. The imminence of a Ger. attack at Verdun became apparent in the middle of Jan. 1916, and General Herr, the Fr. local Commander, reported that he considered the defences to be inadequate to withstand the strain. General de Castelnau (*q.v.*) (Chief of the Staff) immediately went to Verdun to make a personal reconnaissance, and gave orders for certain works to be carried out which would strengthen the defensive area. There was not time, however, for these orders to be completed before the Gers. launched the attack. This was at 6 p.m. on Feb. 21, and on that day they gained Haumont Wood and on the 23rd the whole of the first position was in their hands. On the 25th the Gers. occupied Fort Douaumont (*q.v.*), which the Fr. had failed adequately to garrison in spite of the importance which Joffre attached to it. General Pétain was then placed in command of the operations at Verdun, with twelve divisions at his disposal. The first Ger. attack on the left bank of the Meuse began on March 6, and although operations were continuous for nearly a fortnight, they made but little progress. On the right bank the Gers. were making desperate efforts to capture Fort Vaux to facilitate their general attack on the second line of defences; but in spite of the employment of unprecedented artillery bombardments and the use of liquid flame (*flammenwerfer*) they failed to take the fort. In April General Nivelle assumed command of the Fr. troops on the right bank, and the spirit of the offensive now imbued the Fr. A month later Nivelle was promoted to the chief command of the Army of Verdun. Exasperated by recent reverses at the hands of Berthelot and Mangin (*q.v.*), the Gers. increased their efforts to secure victory on the left bank, but made no appreciable progress after practically a whole month's fighting.

The imminence of the Allies' Somme offensive was now beginning to weigh with the Ger. High Command, and, in order to prevent Fr. reserves from being transferred to the Somme, the offensive against Verdun was intensified. The first week in June saw vigorous attacks launched against Fort Vaux, which resulted in its capture on the 7th. Another great Ger. onslaught commenced on June 23, and although active operations were maintained until Aug. 8, little advantage was gained. On Aug. 29 von Hindenburg succeeded von Falkenhayn as Chief of the Ger. General Staff, and he

ordered all offensive operations at Verdun to cease. On the Fr. side, however, General Mangin had been largely responsible for the recent Fr. gains on the right bank of the Meuse, and he at once planned the recapture of the lost forts. Operations were begun in Oct., and by the end of the year nearly all the lost ground had been regained. Verdun had an important bearing on the campaign: it was a great victory for the Fr. and a correspondingly disastrous defeat for Germany, whose armies could not repair the enormous losses sustained, in the abortive attacks, from the fire of the celebrated Fr. 75-millimetre guns and mitrailleuses and, indeed, the influence of this crushing failure was felt by Germany to the end of the war.

The First Battle of the Somme.—The year 1916 also saw the great Battle of the Somme (or First Battle of the Somme) (*see also* SOMME BATTLES) which had as serious consequences for the Gers. as those of the Verdun battle. As previously stated, this Somme offensive had been decided on at the end of 1915; but it could not be launched until the British forces had been adequately reinforced. The object of the offensive was to obtain a military decision at one colossal blow. The offensive failed of its purpose; yet it effected much in exhausting the Ger. military resources. As succinctly stated in a publication issued by the Ger. War Records Office, 'It would be erroneous to measure the results of the Battle of the Somme by mere local gain of ground. Besides the strategic objectives, the British and Fr. followed out a definite plan of exhausting the power of the defenders by the employment of great masses of artillery in constantly repeated attacks.' In addition to wearing down the Gers., it was necessary to arrest their progress at Verdun, and this could only be achieved by compelling them to transfer their reserves to some other and dangerously-threatened point. But it would be erroneous to regard the Somme Battle as a mere large-scale 'sympathetic' action: it was projected before the Battle of Verdun, and without relation to the threat in that quarter: it was, indeed, hoped to secure by this sustained and co-ordinated advance on a 30-m. front a result which should have really decisive consequences. The relief of the situation at Verdun was a secondary and later consideration. The Battle of the Somme saw two important innovations: (1) the invention of the 'creeping barrage' (*see also* BARRAGE) of artillery

fire by General Horne, and (2) the employment of tanks (*q.v.*). It is also worthy of remark that the work of the Allied air forces was of the greatest importance in this battle, in destroying enemy aircraft and in taking photographs of enemy positions.

The tactical objective of the Allies was the ridge N. of the Somme, extending through Thiepval, Pozières, Bazentin-le-Petit and Morval, beyond the Ger. line, for this ridge dominated the country towards Bapaume, and from it the Allied artillery could command an extensive area. The general plan was to administer a succession of hammer-blows, alternately British and Fr., in order to distract the enemy, so that he might not know at what point to expect an attempt to pierce the line. The battle was carried out in three main phases. The first phase commenced on July 1, with an attack by the British Fourth Army, under General Rawlinson, between the Somme on the right and Gommecourt on the left. Although the attack was preceded by an artillery bombardment of unprecedented weight—shells being almost unlimited at this period—some of the Ger. defences were subsequently found to be still intact and many proved fully equal to the extraordinary pressure to which they had been subjected. This was due to the fact that the Ger. line here having been stationary for over eighteen months, the Gers. had spared neither time, labour nor ingenuity in strengthening the positions. Localities which in 1914 were nothing more than scattered farm-houses and small villages had evolved into formidable fortresses, so that at every step forward the Allies found evidence of the remarkable advances which science had made in field defences. On the left of the line attacked (*i.e.* from the Ancre to Gommecourt) the Allies made very little progress; but between the Ancre and the Somme, where the Ger. artillery were in less strength, a definite hold on the enemy positions was obtained in many places. The fighting on both sides was of the fiercest character, and the constant bringing-up of fresh troops kept the tension at high pitch throughout the whole operation. The difficulties of supply, transport, communications, and evacuation of casualties were increased for the Allies the further they advanced; because, although their artillery-fire had done its work effectively, it had at the same time destroyed the roads and other routes. After three

days' fighting a 16-m. breach was made in the Ger. line, such places as Montauban, Mametz, Fricourt and La Boisselle falling into British hands. On July 7 the Leipzig Redoubt was captured, and four days later Contalmaison and Trônes Wood fell. The attack was renewed on the Bazentin-le-Petit and Longueval front a few days later: then on July 16 Ovillers was captured and the Australians stormed Pozières on the 23rd. A few days afterwards Delville Wood (*q.v.*) was captured and on the 27th, after a tremendous effort and at great sacrifice on both sides, the first phase was concluded with the capture of Longueval. The Allies had broken through the first and second Ger. defensive systems, and between the Ancre and the Somme the Allied line formed a great salient to the N.E.

The second phase began with an advance by the Fr. on the Somme coupled with determined efforts by the British to improve their tactical position near the Ancre, about Thiepval and Pozières. The strenuous resistance of the Gers. had stopped the advance at this point, thus making a sharp angle in the British line and also preventing the use of the Albert-Bapaume road. Moreover, guns at this point could enfilade the new British line about Bazentin and Longueval, so that a rectification here was essential to any advance further East. The highest point of the ridge had not yet been reached, so that visibility from the ground was still somewhat restricted, and although the Allies had gained the supremacy of the air in this region, security could not be assured until the ridge was wholly in their possession. A general advance was made by British troops from Guillemont to Thiepval on Aug. 18. From the outset the fighting was desperate, particularly round Guillemont, which did not fall until Sept. 3. On the left of the line the Gers. tenaciously defended Thiepval, and many heavy counter-attacks were launched in their anxiety to hold this position at all costs. Ginchy was also the scene of much bloodshed, but eventually the British advance prevailed and the place was captured on Sept. 9. Being now in possession of Guillemont, Ginchy, Delville Wood and Longueval, the Allies were on an equality with the Gers. from the standpoint of visibility and in a position to command Combes on their right and enemy positions about the Albert-Bapaume road on their left. The Fr. had, in the meantime, gained Cléry and Le Forest and were winning back from

the invaders their own territory—a fact which heightened the morale of the troops. The Ger. resistance, however, N. of the Ancre was still not only sustained but most costly to the attackers, who, in consequence, suspended the advance in this area.

The third phase commenced on Sept. 15 with an advance on a 6-m. front from Ginchy to Courcellette. It was on that day that tanks were first employed in battle, and, speaking generally, they proved a failure at this stage of their development largely through foundering in the mud. They came, however, as a complete surprise to the Gers., although their construction and trial had been proceeding for some months previously. But if their performance on this occasion did not fulfil the expectations of those who, in the teeth of opposition, had advocated their manufacture, they gave great assistance to the infantry by breaking up machine-gun nests and small posts which either had not been or could not be touched by artillery fire. This advance once launched, it was found that the Ger. resistance was weakening; for many batches of prisoners were taken without a fight. On the left the Gers. were still holding stubbornly to Thiepval, but even here 'cracks' were becoming noticeable in the defence, and when Pozières fell, and the victorious British troops advanced beyond it, threatening Thiepval from the E., the Ger. line broke. On the right, Combes was gradually becoming surrounded by the British on the N. and the Fr. on the S. and by Sept. 26 the Fr. were in possession of the place. By the end of July the very definite angle at Thiepval had been 'flattened out' and the Allies' line ran along the lower N. and E. slopes of the ridge, so that their tactical objective had at length, but at great cost, been gained.

Battle of the Ancre.—In Oct. and Nov. further offensive operations were undertaken by the Allies in order to realise more fully such advantages of position as were gained in the Somme Battle. As previously stated, Sir Douglas Haig could make little impression on the Gers. N. of the Ancre, about Gommecourt and Beaumont Hamel. He now decided to advance in this particular area—an operation known as the Battle of the Ancre (*q.v.*). The Ger. defences, which had proved so formidable when tested the previous July, had been further improved as a result of experience gained in the course of the Somme Battle. The British began opera-

tions on Nov. 11 with two days' terrific bombardment and on the 13th captured their first objectives. Steady progress continued to be made until bad weather brought the operations to a close on Nov. 19, by which time the British line ran E. from N. of Beaumont Hamel and to near Grandcourt, Le Sars, Gueudecourt and Sailly-Saillisel, where it joined the Fr., whose line ran S. to just N. of Péronne.

In contrast with 1915, the year 1916 ended on a note of optimism and confidence for the Allies. Their successes at Verdun and on the Somme, albeit costly and, in the nature of modern warfare, inconclusive, had gone far towards establishing a definite superiority over the Ger. war-machine and to hold out a prospect of ultimate victory.



MARSHAL JOFFRE

Marshal Joffre Superseded.—In Dec. 1916 it had been agreed that in view of the appreciable gains on the Somme the Gers. should be given no rest throughout the winter and that the Somme battle should be 'continued' in Feb. 1917. Marshal Joffre advised that the British troops should, in such event, be required to take an even larger share in the operations than heretofore. When this advice became generally known in the Fr. army it provoked resentment, being interpreted as an aspersion on their valour, in the sense that the honour of taking the major part in military affairs in their own country was thenceforward to pass from the Fr. to the British army. The extreme tension in France at this time, coupled with the fact that the Fr. Army is never divorced from politics, affords an explanation of the readiness shown

by many Fr. politicians during these deliberations to criticise Joffre's leadership and in that regard to find in this, his latest expression of opinion, grounds for discontent which they were not slow to exploit. The upshot was his supersession on Dec. 16, 1916, by General Nivelle, who had become a popular figure by reason of his success at Verdun. That the moment was opportune for the resumption of the Somme operations would seem evident from the statement of von Ludendorff that the Gers. 'were completely exhausted on the Western Front' after the Somme Battle, and were 'in urgent need of a rest' (*War Memories*). At the Ger. Headquarters there was apprehension lest the battle should be renewed at points which would give them no time whether for recuperation or for the accumulation of material. But although, as already stated, it had been agreed among the Allied Commands that the enemy should be given no rest throughout the winter, this agreement was now ignored. The relations, indeed, between the Allied higher commanders were not at this time the most cordial. Nivelle had prepared a plan which presupposed that Haig should be placed under his orders. To his astonishment, Haig found that this plan had been acquiesced in by the Prime Ministers of both Great Britain and France. It was, however, eventually agreed that the British Army should be 'regarded as Allies, and not subordinates by Nivelle.' This agreement was not reached until the middle of March, with the result that the enemy obtained the respite of which he was in such sore need. During this valuable interval, the Gers. had been preparing a new defensive system from La Fère on the R. Oise to Arras on the R. Scarpe—a line which gained notoriety among the troops as the 'Hindenburg Line' (*q.v.*). This new line was some miles in rear of the area covered by the Somme offensive of 1916, a point which is to be borne in mind in the light of subsequent events, and particularly Nivelle's supersession by Pétain.

1917

German Retreat to the Hindenburg Line.—The operations on the Ancre, which were brought to a close in Nov. 1916, were opened again in Jan. 1917. The Gers. fell back from the commencement, and General Sir Hubert Gough (*q.v.*), who was in command of the British troops in this area, ordered the attack to be pursued with all possible

speed. On Jan. 11 the British captured a spur N.E. of Beaumont Hamel, which enabled them to command the entire Beaucourt Valley and the W. slopes of the spur beyond the Valley, from Grandcourt to Serre. Operations were at once begun to clear the remainder of the valley S. of Serre Hill and to push the line forward to the crest of the spur. On the night Feb. 3-4, an important Ger. line on the S. slopes of this spur, forming part of the enemy's original second-line system N. of the Ancre, was captured after desperate fighting and by Feb. 5 General Gough had gained his objective. On Feb. 7 the Gers.' great withdrawal to the prepared Hindenburg Line began. In some cases towns were evacuated without any fighting, but in others key positions were defended with the enemy's usual tenacity. By Feb. 17 Miraumont, N. of the Ancre, and Baillecourt Farm, S. of the river, were taken. On Feb. 25 the Gers. fell back about 3 m. on an 11-m. front, leaving Serre, Pys and Warlencourt in British hands. On Feb. 28 the strong Ger. pivot of Gommecourt was captured. By March 10 the important position of Ires fell, and three days later the enemy abandoned his main defensive position on the Bapaume Ridge. Here the British drove in his rear-guards and occupied Gréville and Loupart Wood. Bapaume fell on March 17 and by the 18th the Gers. were in full retreat from Soissons to Monchy. A rapid British advance gave them Nesle, Chaulnes and Péronne, while further S. the Fr. captured Damery and Noyon. The Ger. retreat was a confession of defeat and of inability to withstand the Allied artillery, which had now gained a definite ascendancy; but all the arts of the propagandist were employed in Germany to interpret the retreat as the most masterly of strategic movements. The methods of destruction which accompanied the retreat betrayed the characteristic savagery or 'ruthlessness' of the Ger. military doctrinaires. Almost every building and tree was destroyed; mines and every kind of death-trap were prepared with inhuman ingenuity. Such devices delayed the pursuit, and it was not until the Allied Armies had reached the 'Hindenburg Line,' and the pressure became general, that they could develop plans for the future conduct of the campaign.

In Nivelle's original plan for an offensive he had allotted to the British forces a front which included the area from which the Gers. had

withdrawn. It was naturally expected that the Ger. retreat would necessarily profoundly modify this original plan; but Nivelle decided to make no change. This decision raised misgivings over his capacity for leadership and, coupled with his failure to break through with the Fr. army on the Aisne between April 16 and 20, practically decided the Fr. Gov. to supersede him. This was effected on May 15, 1917, when Pétain became Commander-in-Chief of the Fr. Armies. At this time the morale of the Fr. troops was not at its highest: the failure on the Aisne had brought about widespread dejection; 'defeatism' (see BONNET ROUGE; CAILLAUX; EUROPE; MALY) was preached everywhere, and mutinies broke out in several places. Pétain set to work to eradicate these evils, and through manifest defects in the Ger. military intelligence their existence was never suspected at Ger. Headquarters. In order to keep the Gers. occupied while the re-conditioning of the Fr. army was in progress, General Haig was asked to continue the Battle of Arras, which had been commenced on April 9 (see ARRAS, BATTLE OF).

Battle of Arras.—The Battle of Arras had for its purpose the removal of pressure on the Fr. in Champagne, so that Nivelle's plan for breaking through the Ger. line could be accomplished. The original objectives were the Vimy Ridge and Douai. The Ridge was brilliantly captured by the Canadian troops and, generally, the advance was successful at all points during the first few days. The bitter struggle for Lens opened on April 14, the environs being reached only after the sternest fighting. After a short pause, the battle was resumed on April 23, on both sides of the Scarpe, E. of Arras. Here the pressure increased owing to the bringing up of Ger. reserves. Progress E. of the Vimy Ridge was also made between April 28 and May 3. On the latter date, following a great 'spurt,' the Canadians captured Fresnoy. By the beginning of July the Allies' line had been advanced in this region to just W. of Lens, thence S. to Chérisy. The Battle of Messines had already begun on June 7, the signal for which was the explosion of nineteen huge mines under the Ger. line. General Plumer's Second Army carried out the attack, which was launched at 3.30 a.m. The Messines-Wytschaete Ridge was stormed, and, before noon, both Messines and Wytschaete were captured. In the afternoon Oosttaverne was taken together

with its rearward defences over a 5-m. front and some 5000 prisoners. Further progress was made on June 12 E. and N.E. of Messines.

Third Battle of Ypres.—Passchendaele.—On July 31 a series of operations commenced known as the Third Battle of Ypres, which had for their primary purpose the driving of the Gers. from their bases on the Belgian coast so as to thwart their submarine campaign. The secondary purpose was to ease the pressure on the Fr. further S. Progress was made S.E. of Ypres, and particularly on the N., where St. Julien and Pilekem were captured, thereby depriving the Gers. of the ridge from which they commanded Ypres. After the first onset, however, bad weather set in, which made movement impossible. The attack was resumed on Aug. 9, and in the first week the British captured Langemarck. The Fr. troops on the left had also made some progress and had captured Graschten. General progress continued E. and N.E. of Ypres until Aug. 27. Three weeks later the battle was resumed along the Menin Road, and particularly heavy Ger. counter-attacks were repulsed on Sept. 22. A few days later the British cleared Polygon Wood and stormed Zonnebeke. Again the Gers. heavily counter-attacked, but were repulsed with the heaviest losses. On Oct. 4 another push was made from E. of Ypres to Langemarck, where all tactical objectives were gained. On Oct 9 a great combined Franco-British attack was made N.E. of Ypres between Passchendaele and Mouthuist Forest. The Canadians gained the rising ground S. of Passchendaele by the 26th, and the Fr. advanced along the Bixschoote-Dixmude road and captured Luyghem. After very gallant fighting the Canadians captured Passchendaele on Nov. 6 and the protracted battle closed with the Franco-British positions well advanced N., E. and S.E. of Ypres. Over 20,500 prisoners were taken, together with 55 guns.

British Attack at Cambrai.—The Gers. were given very little respite before the British Third Army, under General Byng, attacked them on Nov. 20 near Cambrai. The Gers. had at this time been pressing hard on the Italian front with troops drawn from the W. Front and the Battle of Cambrai was designed to stop the transfer of Ger. troops to that front. The battle is particularly noteworthy for its novel opening, in that the usual artillery bombardment was dispensed with, tanks being employed instead. (See CAMBRAI, BATTLE OF). This new method

and the advantage of not apprising the enemy beforehand at what point or when the attack was to be made. This revolution in tactics was completely successful, and a deep penetration was made into the strong Ger. positions for 5 m. on a 10-m. front. The prisoners taken numbered over 10,000. Among the places captured were La Vacquerie, Flesquières, Marcoing, Havrincourt, Graincourt, Anneux and Ribécourt. The next day the British line was advanced S. and S.W. of Cambrai. The important position of Bourlon Wood still remained in Ger. hands, and owing to its strategic value, in dominating as it did the battlefield in this area, its capture was of the first importance. Hence on Nov. 23 a large number of tanks, supported by infantry, were launched against it, and by nightfall it had been taken, although the village still remained with the enemy. Heavy Ger. counter-attacks, however, succeeded in regaining Bourlon Wood for the enemy, and the British were withdrawn to a less exposed line. Over 11,000 Ger. prisoners and 145 guns were taken, the Ger. casualties being in the neighbourhood of 100,000.

Results of 1917 Campaign.—Thus ended the year 1917 on the W. Front, where the Allied armies had not only made deep inroads into the Ger. line, but far deeper into their man-power. Nevertheless, owing to the Russian Revolution and the elimination of the Russian armies as a fighting force, the Gers. were rapidly building up their forces on the W. Front with accessions of troops from the E. France had reached the limit of her reserves, and Great Britain was approaching that point. The U.S.A. had, however, declared war on Germany, and it was to this source that the Allies looked with confidence for that necessary increase of strength which would bring the war to a victorious conclusion. The control of the war on the Allies' side entered a new era when, as a result of the defeat of the Italians in Oct. 1917 (see CADORNA; CAPORETTO), a conference of Allied Ministers took place at Rapallo on Nov. 6, at which it was decided to set up a Supreme War Council at Versailles with military representatives to advise it. General (later Marshal) Foch was appointed President of the military representatives and was given executive power. Difficulties, however, arose at once, as the new Council was not popular with the Commanders-in-Chief. The British were asked to take a larger section of the front from the Fr.,

and, in spite of protests from Sir Douglas Haig, the British front was increased.

1918

German Preparations for Final Offensive.—As in the winter of 1916-1917, so now a change of command brought misunderstanding and delay in offensive action, during which interval the Gers. were preparing for their great and final offensive in the spring of 1918 on the W. Front. Their most important consideration was at any cost to defeat the Allies before the American troops arrived to reinforce them. As early as Nov. 1917 Ludendorff had decided that 'the British must be beaten', and schemes were formulated to achieve that end. The most extraordinary precautions were taken to ensure secrecy, for success depended on surprise. No change was made in the troops holding the front nor were they told of the projected offensive. Troops for the assault were assembled well in rear of their line, and all large movements were carried out at night. A number of officers were detailed for the special duty of ascertaining from aircraft whether any signs, common to preparations for an offensive, were likely to be observed by the Allies. In this they were aided by weather conditions, which were such as to preclude the taking of photographs from the air for some weeks prior to the launching of the assault on March 21, 1918. On this day the Gers. attacked on a wide front from La Fère on the S. to Arras on the N. They employed over sixty divisions, two-thirds of which were opposed to Gough's 5th Army, which was covering Amiens, the remainder being launched against Byng's 3rd Army, which prolonged the line northward. The 5th Army was widely strung out, and being opposed by such overwhelming numbers, was forced to withdraw. On the other part of the front the Gers. met with such obstinate resistance that little progress was made.

Second Battle of the Somme.—The Gers. attacked in massed formations, and their casualties were on a colossal scale. Before the offensive had opened the British and Fr. Commanders-in-Chief had come to an agreement that if one were attacked and not the other, the latter would send reinforcements to the former. Although the attack was launched with the object of 'beating the British,' Ludendorff changed the whole plan as soon as he learned that his 18th Army (von Hutier) had gained a tactical victory over

the British 5th Army, which was in touch with the Fr. He now wished to exploit this victory and separate the British and Fr. armies by driving in a wedge between them. He proposed to do this by rapid advances on both sides of the Somme. He ordered the 4th, 6th and 7th Armies to attack the British N. of the Somme 'in order to drive them into the sea'; and further ordered that, 'S. of the Somme, the operation was to be carried out offensively against the Fr. by a wheeling movement into the line Amiens-Montdidier-Noyon, followed by an advance south-westward,' direct on Paris. Whilst the Allies were thus being separated the Ger. 2nd Army was to march on Amiens on both sides of the Somme. In view of the threat to Amiens, it was found impossible for Pétain to carry out his promise to Haig, although the latter was heavily attacked on a 50-m. front. This lack of co-ordination between the Fr. and British in their efforts to resist the Gers. was calculated to lead to the most serious consequences, and it was in these circumstances that Foch was given the necessary powers to co-ordinate these operations. He at once began to exercise his personal influence over the various commanders and to such good effect that the Gers. were brought to a standstill on the line Oise-Arras by April 4, and touch between the two armies was maintained. This masterly strategy unquestionably retrieved a most menacing situation. Before this date, however, the original scope of the Ger. attack had been widened again so as to include the terrain as far S. as the Aisne. In this connection it may be noted that General von Kuhl, in a report to a committee of inquiry set up by the Ger. Gov., says categorically—'The offensive power of the Gers. was no longer sufficient for all these tasks, as was soon proved.'

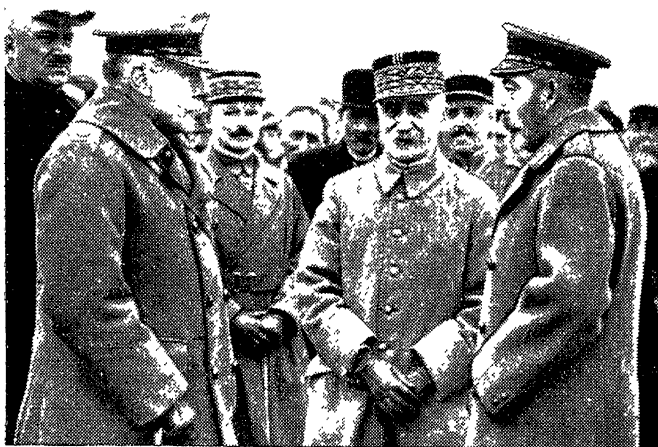
The Battle of the Lys—The Threat to Amiens.—The second Ger. offensive was launched against the British on the Lys. For some time it had been apparent that an attack was in course of preparation in this area, the evidence being gathered mainly from air photographs. According to General von Kuhl, the ultimate decision to attack at this point was not made until April 1. Final intimation of the coming blow was not received until April 7, when, through a Ger. prisoner, it was learned that the attack was timed to commence on April 9 (Ludendorff's birthday), which proved to be the correct date. This warning was

very opportune to the British, for it gave them time to move their reserves into a selected position. Compared with the first or Somme offensive it would seem that the Ger. High Command did not intend this later offensive to be on so large a scale, as they employed only seventeen divisions. Prince Rupprecht was in command, his objective being Armentières in the Ypres sector, as a stepping-stone to reaching the Channel Ports. It was therefore essential for the British to defend *à outrance* every foot of ground. The Ger. pressure was, however, as overwhelming as in their first offensive, and gradually they gained ground, although at great cost. One very important gain was Kemmel Hill, which they took on April 25, but all attempts to pierce the Ypres defences were vigorously repulsed. Further S. the Gers. made desperate efforts to reach Amiens, but their way was barred at Villers-Bretonneux by the Australians, who fought with great gallantry. At Givenchy and Festubert, on the left of the Lys offensive, the Gers. suffered a severe reverse. In his 'Memoirs' Ludendorff significantly states—'On the left at Givenchy and Festubert we were held up. The result was not satisfactory.' This occurred on the day the offensive began. On the British side this part of the line was held by the 55th (West Lancashire) Division of Territorial soldiers, and the attacking troops were the 4th Ersatz Division. The tactics employed by the Gers. were those of the successful infiltration type. A Divisional Order of the Gers. stated that their artillery would prevent the Eng. from using their reserves. It also contained some contemptuous observations on the fighting qualities of the British troops holding the line, by way of stimulating the attacking troops. However, in the result not a yard of the British position was lost, whereas over 750 Ger. prisoners and seventy machine guns were taken. The Ger. reserves were crowded three-deep in trenches just in rear, and these were killed almost to a man by British artillery. Fresh reserves sent up in support could not find cover in the trenches already filled with their dead comrades, and so met the same fate above ground. So confident of success had the Gers. been that they had their bands with them, and musical instruments littered the field for weeks afterwards. The British had held their ground by small self-contained posts, organised for all-round fire with intervals well

laced with barbed wire. Independent platoon counter-attacks had completed the Ger. confusion. This system of defence was found to be the most effective counter-move to the Ger. system of infiltration tactics. As a set off against this disaster the Gers. had occupied the Messines-Wytschaete Ridge and the outskirts of Armentières and Merville. It was during these fateful operations that Sir Douglas Haig issued his famous order—'Words fail me to express the admiration which I feel for the splendid resistance offered by all ranks of our Army. With our backs to the wall, and believing

to 303,000, including over 28,000 killed. None the less, Foch's confidence in the British Army remained unimpaired.

The third phase of the last Ger. offensive of the Great War was now being considered. Ludendorff was still of opinion that the British must be beaten, but he could not do this until the Allied reserves had either been destroyed or attracted elsewhere. It was therefore decided that the Fr. should be attacked by the Crown Prince William on the Chemin des Dames (*q.v.*) in order to draw off the Allied reserves from the British front. In the Operation



LORD HAIG, MARSHAL FOCH AND KING GEORGE V. ON A VISIT TO THE BATTLEFIELDS

in the justice of our cause, each one of us must fight to the end.' Foch had been made Commander-in-Chief of the Allied Armies in France and Flanders on April 14 with power to direct their strategical movements, but not their tactical handling. During the third week of April the Ger. supply system became faulty, and Prince Rupprecht asked for permission to break off the battle, to which Ludendorff agreed. It was later discovered that Ludendorff was losing heart because 'the second grand attack had not brought the hoped-for decision.'

Final German Offensive Ended.—On April 30 all movement came to a standstill. In March and April the British Army had suffered terrible losses, their casualties amounting

Order of May 1 Ludendorff stated, 'The object of the attack is to loosen the present united Allied front opposed to Crown Prince Rupprecht's Group of Armies and to create thereby a renewed possibility of a successful continuance of the offensive against the British.' Although the Gers. had plenty of ammunition, they were feeling the want of men both in quantity and quality. Thirty divisions took part in this attack, twenty-six of which had already been employed in previous assaults. The attack opened on May 27 between Rheims and Soissons. It took the Fr. entirely by surprise, and was completely successful, penetration being made on an 18-m. front, and within a few days the Marne was reached between

Dormans and Château Thierry. Designed merely as a diversion, it had become a great battle. It was, however, brought to a standstill on June 5, but not until it had, in the words of von Kuhl, 'gone fatally too far,' for nothing more than a great salient had been created in the Ger. line. They had, however, captured 50,000 Fr. prisoners and 500 guns. On June 9 the Gers. launched an attack against Matz, but owing to stubborn resistance it soon subsided.

The topographical result of these offensives of 1918 was the creation of deep salients in the Ger. line, and there were divided counsels at Ger. Headquarters regarding the further action to be taken. Some thought it advisable to go back to the positions held before the first offensive on March 21, but before any scheme could be finally decided, the Allies had seized the initiative and launched the counter-offensive which brought the war to a close.

The Final Allied Offensive or Advance to Victory (July 15, 1918 to November 10).—In the great Allied offensive battle of 1918, or rather series of battles, two periods may be distinguished: the first (July 15-Sept. 26), during which the Allied High Command baffled the enemy's attacks, began to strike in its turn, and forced the enemy to put himself on the defensive; the second (Sept. 26 to Nov. 10), when the Allies passed to the general offensive, hit the enemy without respite on the entire front from the sea to the Meuse and so exhausted him that he was compelled to ask for an armistice in order to escape the disaster which the next succeeding attack would have brought on him without hope of being in a position to reply.

The first period comprises: The Second Battle of the Marne; The Battle of Picardy. The second, the Battle of Champagne, the Battle of Cambresis, the Battle of Flanders.

The nomenclature of these battles is that of the Fr. General Staff. In Eng. records the principal battles fought during this period by the British Armies are known as the Battle of Amiens, Aug. 8-12; Battle of Bapaume, Aug. 21-31; Battle of Arras, Aug. 26-Sept. 3; Battle of Epéhy, Sept. 18-19; Battle of Cambrai-St. Quentin, Sept. 27-Oct. 10; Battle of Ypres, Sept. 28-29; Battle of Courtrai, Oct. 14-31; Battle of The Selle, Oct. 17-25; and the Battle of Maubeuge, Nov. 1. The last Ger. offensive, as already indicated, was in the middle of July, when the Gers. began an assault on the Fr. on a front of 55 m. E. and W.

of Rheims, their right wing operating on the line of the Marne. From the Fr. side the right of the attack stretched from the village of Prunay, E. of Rheims, to the hills known as the Main de Massiges, just W. of the Argonne Forest in the Champagne. The left extended from Possoy village, S. of the Marne and E. of Château Thierry, to Coulommies village, S.W. of Rheims.

As far back as June 12 the rush of the Ger. armies on Villers-Cotterets on the one side and on Compiègne on the other was stopped. But everything led the High Command to suppose that the enemy, after a period of rest for reconstituting his reserves and supplies, would undertake a fresh and powerful effort. Foch was in a position to know at every moment the precise strength of the Ger. army, to follow its progressive wastage, and to adapt his decisions according to the enemy's situation. At the end of June the Ger. army was estimated to comprise a total of 207 divisions: 130 in line, seventy-seven in reserve, of which thirty-one were fresh, twenty-six reconstituted and twenty fatigued. It was at first believed that the enemy would attack on the British front, and that the attack would be before the beginning of July; but by July 10 it was clear that the principal assault would be in Champagne. The Fr. army, reinforced by divisions of young American soldiers, awaited in confidence the expected attack, and Foch already saw in the 'attack for Rheims' a favourable occasion for turning to the offensive.

From the opening days of July Foch decided to deliver a counter attack on the front between the Aisne and the Oureq, this counter attack to be combined with a second attack on the opposite side of the Château Thierry 'pocket,' so as to close this pocket, or at all events to compel the enemy to evacuate it. At the same time a counter-offensive in E. Champagne was contemplated, to be delivered on the E. flank of the main Ger. attack in the event of the Gers. making progress southward. With this end in view, forces were concentrated to the S. of the Argonne. On the same day that the Ger. divisions set out towards the starting points of their assault, Allied divisions were concentrating to attack them in flank. This was the first time the Allies had acquired the initiative over the Ger. Command. Thenceforth they kept it throughout.

On July 14, of the eighty-one divisions of the enemy thirty were disposed behind the troops in the sector from Château Thierry to the

Argonne; and on the morning of July 15 they too combined in the assault.

In the Champagne the Ger. attack gave way in front of the foremost Fr. positions; between Rheims and the Marne it was repulsed in front of the second positions; to the S. of the Marne it secured a foothold on the heights between Jaulgonne and Dormans, forming a pocket from 6 to 8 kms. in depth. Throughout July 16-17 the enemy's whole effort was directed towards Epernay; but, counter-attacked without cessation, the Gers. could make only slight progress. From the evening of July 17 their advance was completely held up. Instead of breaking the Franco-American front and forming a vast pocket in Champagne and Brie, the enemy's attack resulted in nothing better than tactical successes of a purely local character, successes which in no way compensated him for his heavy losses. Moreover, the situation, as a whole, of the 5th and 1st Ger. Armies was not improving; the troops which had crossed the Marne were in a precarious situation; for they were threatened with the chance of being flung back across the river at any moment, while their supplies could only be brought up over bridges which were being incessantly pounded by the Allied artillery and airmen.

The French Offensive Begins on the Marne.—On the 18th the Ger. Command began to be conscious that they were defeated. It was at this precise moment that Foch launched the offensive with the 10th and 6th Fr. Armies. (The enemy was fearful of this offensive and there are in the possession of the Fr. General Staff numerous documents establishing this apprehensiveness.) The 10th Army at one rush reached the approaches to the road from Soissons to Château Thierry. The result of this success was that the knot of roads from Soissons, the branch railroads from Nissy-sur-Aisne over which were passing the supply columns for the masses of enemy troops congested in the Aisne-Marne loop, fell under the fire of the Fr. guns. The 5th Army, assisted by the Italian Army Corps, took up the offensive between the Marne and Rheims, in liaison with the operations of the 10th and 6th Armies. Thus both flanks of the enemy's line were shaken, and the Ger. High Command saw that they could no longer engage battle in the pocket, where their communications were threatened. Yet the exigencies of the conflict compelled them to fling fresh divisions into it every day!

Thus the Ger. Command, who but four days previously were rushing to the attack, found themselves constrained to submit to the will of their adversaries, and, in these circumstances, ordered the retreat.

The beginning of the Ger. Retreat from the Marne.—The retreat was slow and methodical, but was very costly, by reason of the fact that in order to save the great accumulation of material and stores between the Marne and the Aisne the Gers. were continually compelled, by reason of the extraordinary tenacity of the Allied attacks, to engage new units. From July 18 the High Command had to call for reinforcements from all parts of their front—General Gallwitz had to despatch three divisions and the Crown Prince of Bavaria six. This was not sufficient, for the tired divisions which had delivered the attack in Champagne on July 15 were called upon for a fresh effort, while orders were given to countermand the attack projected against the British in Flanders. (This appears from a secret order of the 4th Ger. Army dated July 22.)

On July 19 the Gers. had recrossed the Marne. Before the incessant attacks of the Fr. and American troops they were falling back by the 27th on the Ourcq; and on Aug. 4 they were on the Vesle. Things had therefore gone directly contrary to the Ger. plans. The Ger. front, instead of forming a threatening salient in Champagne and Brie, had been pushed back on the Aisne and Vesle; while the Fr. reserves, far from being employed exclusively in stopping up the gaps in the Allied front, had assumed a brilliant counter-offensive; and only a very small part (two divisions) of the British reserves had up to this time been employed in the battle. The reserves of the Bavarian Crown Prince, on the other hand, were perforce rushed down precipitately from Lille towards the Aisne. Finally the Ger. Command had to renounce its cherished plan of an offensive in Flanders, and it was thenceforth open to the Allies to assume the initiative in a new battle between the Oise and the sea.

The Battle of Picardy.—Marshal Foch, in order to retain the initiative and to leave the enemy no opportunity of recovery, perfected his plans for delivering separate attacks in as rapid succession and with as large an element of surprise as possible, to the end that he might bring about the progressive disorganisation of the enemy's armies—and to continue in this manoeuvre until such time as he should order a general attack upon the whole Ger. front. Having veri-

fied the fact that, as from July 12, the enemy was maintaining in line between the sea and the Oise tired troops of poor quality, Marshal Foch meant to derive every advantage from this weakness by undertaking important offensive actions; and he accordingly directed the attention of Field-Marshal Haig to the Festubert-Robecq front, an attack on which would allow of the liberation of the mining basin of Bruay. He planned, in addition, a joint and simultaneous operation by the 4th British Army (General Lord Hawlinson) and the 1st Fr. Army on the Amiens salient in order to free the Paris-Amiens railway; and finally he arranged for the American attack for the 'flattening out' of the St. Mihiel salient. So that the counter-offensive of the Marne was hardly organised and set in motion before three other distinct operations, each on a large scale, were in course of preparation.

On July 23 the 4th British and 1st Fr. Armies attacked on a 15-m. front astride the road from Amiens to Roye and between Albert and Moreuil.

In forty-eight hours they had advanced over 10 m., reached the outskirts of Chaumes and Quesnoy and were threatening to outflank the 18th Ger. Army from the N. On Aug. 10 the Ger. Army began to fall back on the 1917 positions between Chaumes and the Oise, but, surprised by a sudden attack by the 3rd Fr. Army, it executed the movement in disorderly haste. By Aug. 15 the Ger. troops were back once more in their 1917 positions on the Chaumes-Ribécourt front, and thus, within the space of a month, the Allies had reduced the two biggest salients of the enemy's line—the one towards Paris, the other towards Abbeville—the two great objectives of the Gers. in 1918.

A serious drain had now been made on the Ger. armies, but the American army was not ready to attack at full strength. Hence Foch, instead of pressing the Albert-Oise front, where the enemy had not been sufficiently shaken in his solidly organised positions, carried the attack on the Ger. wings and notably on the N. wing, where the enemy's reserves were known to be diminishing.

Whilst the 1st and 3rd Fr. armies were tenaciously engaging the enemy to prevent him from drawing men from his centre, the 10th Army was ordered to attack in the direction of Chauny so as to outflank the massif of Noyon-Guiscard-Pergnier; the 3rd British Army (General Byng) prepared to attack in the

direction of Bapaume and Péronne to outflank the Somme defences and constrain the enemy to a more accentuated retreat; and the 1st British Army (General Horne) was to attack still further N. Between Aug. 18 and Sept. 20 these three attacks were all in full motion. As to the first, by Aug. 26 the 10th Fr. Army had reached the Oise and Ailette rivers; the British armies had broken the Ger. front between Croisilles and the Somme; and the 18th Ger. Army was falling back on the Canal du Nord. As to the second, the 10th Fr. Army, crossing the Ailette, had reached the Hindenburg Line, and the enemy was withdrawing to the Aisne. The British 1st Army in the space of forty-eight hours had carried the Drocourt-Quéant (*q.v.*) switch, and, by rendering the Siegfried Line untenable, compelled the Gers. to retreat between Arras and the Oise towards the Hindenburg Line. As to the third, which began on Sept. 18, the 3rd and 4th British Armies, supported by the 1st Fr. Army, carried the outposts of the Hindenburg line, between Cambrai and St. Quentin, and gained their point of departure for the next attack on that celebrated line of defence. Finally, while these last phases of the Battle of Picardy were in progress, the American Army in the Woevre had brilliantly executed its first big attack, reducing the entire St. Mihiel salient between Sept. 12 and 15. (See also ARGONNE.)

General Offensive of the Allies—The Battles of Champagne, Cambresis and Flanders (Sept. 26 to Nov. 10).—Marshal Foch, from the end of Aug., concluded that the time was approaching when the disorganisation and fatigue of the Ger. armies were such that a general attack would bring about their final defeat. He therefore planned three great converging attacks, to be begun simultaneously or at all events at intervals of a few days only. These were: (1) *In Flanders*, where the attenuation of the Ger. line from the Lys to the sea, their fatigue and lack of reserves, were offering a favourable situation for exploitation by the Allies. This operation, begun by the Belgian Army supported by Fr. and British divisions, had for its first tactical objective the capture of a *point d'appui* or starting point, by carrying the front Clerken Forest-Houthulst Ridge-Passechendaele-Gheluvelt-Comines; and, for its second objective, to follow this up at once by an attack on Bruges to free the coast, and, by another attack eastward in the direction of Thielt and

Ghent. (2) A central operation in which the British armies and the left of the Fr. army should attack in the direction of St. Quentin and Cambrai, in order to force the Hindenburg Line before the enemy should have time to organise, while simultaneously the Fr. centre should carry on energetic operations to drive the enemy beyond the Aisne; and (3) an operation in the Argonne in the direction of Mézières, in which all the available American troops should attack between the Meuse and the Argonne, supported on the W. by the 4th Fr. army, which latter should attack between the Argonne and the Souain road.

The various attacks comprised in this general plan were to set aflame at least two-thirds of the Ger. line on the entire front from the sea to the Meuse, and they were to begin about Sept. 25. In fact the Battle of Champagne began on Sept. 26, and after a struggle lasting a week the enemy was compelled to fall back on the Aisne and the Aire, which latter positions were reached by the Allies on Oct. 12. The Battle of Cambresis began on Sept. 27; the 1st and 3rd British Armies attacked in the Cambrai region; and on Sept. 30 the battle had extended as far as the Oise by reason of the coming into line of the 4th British and 1st French Armies. By Oct. 9, the 2nd and 18th Ger. armies had lost the Hindenburg Line—a line which their leaders deemed impregnable—and were forced to fall back on the whole front between Douai and St. Quentin and take up new positions behind the Selle river and on the Bohain-Bernot line. While these two armies were falling back the 7th Ger. Army farther S. was evacuating the massif St. Gobain-Laon, which, as a result of the Allied advance in Champagne and Cambresis, now formed a vast salient, and was retreating to the Serre and taking up positions beyond the Sissonne marshes. (These positions were known as the 'Hunding Line.') This movement was followed by a fresh retreat by the 2nd and 17th Armies, which, hard pressed by Franco-British attacks on Oct. 18 and 19, were retreating across the Oise and the Sambre Canal. The Battle of Flanders, begun on Sept. 28, gave the Allies the hills to the E. of Ypres and threw open in two days the Roulers-Menin road. After a short interval it was resumed on Oct. 14 and from the 17th the enemy was compelled, in the N., to evacuate the whole Belgian coast and fall back on the Terneuzen Canal, and, in the S., to evacuate the regions of

Lille and Lens and to retreat to positions beyond the Scheldt and the Canal du Nord.

In short, between Oct. 10 and 20, the enemy's retreat had become general on the whole front. Foch, with the full knowledge that the wastage and exhaustion of the enemy were such that he could not for any appreciable period of time resist an attack of any importance, gave orders for a prompt renewal of the general offensive from the sea to the Meuse so as to dislodge the enemy from his last defensive organisations (viz., the Hunding and Hermann defences and those of the Lys). On this line Foch calculated that the final battle would be fought. Accordingly, simultaneous and converging attacks by the Allies—namely, by the Belgians and British in the direction of Brussels, by the British between the Sambre and Scheldt, by the Fr. armies in the direction of Givet and by the Franco-American armies in the direction of Mézières and Sedan—began early in Nov., forced the enemy line into a general retreat between the Scheldt and Meuse. On Nov. 9 this retreat had stretched northward, and the enemy was abandoning the course of the Scheldt between Audenarde and Tournai. So that on Nov. 11, the day of the Armistice, all the Ger. armies between the sea and the Meuse were in full retreat.

The British Victories.—The nine principal battles fought by the British Armies in the course of these operations achieved the results indicated:

Battle of Amiens—(q.v.) (Aug. 8-12) Freed Amiens and the Paris-Amiens railway. The attack was then transferred to the N. in the *Battle of Bapaume* Aug. 21-31, which, outflanking the Ger. position on the Somme, obliged the enemy to withdraw to the E. bank of the river. The new Ger. positions were then turned from the N. by the *Battle of Arras* (q.v.) (Aug. 26 to Sept. 3) by which the Drocourt-Quéant (q.v.) line was broken and the enemy forced back on the outer defences of the Hindenburg Line. As the direct result of these three battles the Lys salient was evacuated by the enemy, and Lens, Merrville, Bailleul, and Kemmel Hill were regained, and Hazebrouck and the railways in that vicinity were freed. At the *Battle of Epéhy* (Sept. 18 to 19) the British broke through the outer Hindenburg defences and took up positions for attack on the main line in the *Battle of Cambrai-St. Quentin* (Sept. 27 to Oct. 10), the biggest British victory of all. At the close of some ten days of vic-

torious fighting the attacking troops broke through the last and strongest of the enemy's fully prepared positions—positions manned by the very best of his troops. This now opened the way at last to a war of movement and an advance on the Ger. main lines of communication. The Ger. prisoners taken in this battle were more numerous than in any other engagement in the war. This was really the psychological moment of the great campaign of 1918 in the truest sense, for the Ger. morale never recovered from the blow. The resistance of the Ger. troops most perceptibly fell away, and Ludendorff was warning his Gov. of the probable results. The victorious British now stormed the Canal du Nord and advanced on Cambrai, turned the formidable defences of St Quentin and developed all these successes by delivering a general attack on the last of the solidly organised defences in rear of the Hindenburg Line. In this, the *Second Battle of Cambrai*, that town and St. Quentin were evacuated by the enemy, who then took up fresh positions on the Selle River, the British having in the battle re-taken the double railway line from St. Quentin to Cambrai and the important railway junction of Douai. These great victories had their repercussion elsewhere, for Ludendorff (Ger. White Paper, July 1919) feared that the attack would extend to the front in Alsace, and it seems that the lessening severity of the fighting from this point in the remaining Allied victories and the steady withdrawal of the enemy's forces after actions of comparatively brief duration were due to the difficulty of the Ger. High Command in the matter of reinforcing their line in Alsace.

Even before the close of the first Battle of Cambrai the British 2nd Army, together with the Belgian Army, were forcing the enemy back from Ypres, and driving a salient into his lines which threatened his coastal positions (Sept. 28-29). This success had its sequel in the *Battle of Courtrai* (Oct. 14-31), which forced the Gers. to abandon the Belgian coast, and with it their submarine base of Zeebrugge. With Courtrai, Menin and IJsaluin also fell, and the stretch of road between Ypres and Menin—that veritable mausoleum of British dead in the previous four years of fighting—had now for ever ceased to haunt the life of the British soldier and the waiting people at home. The great salients formed to the S. by the *Second Battle of Cambrai* and to the

N. by the battles of *Ypres* and *Courtrai* led indirectly to the evacuation of Laon and the loss of the famous massif of St. Gobain (captured by the Fr. armies). The penultimate of the great British victories was at the *Battle of the Selle* (Oct. 17-25), and this was speedily followed by the *Battle of Manbenge* (Nov. 1-11), in which the triumphant armies of Generals Horne, Byng and Rawlinson broke the last important lateral communications, turned the Scheldt positions and sent the enemy in rapid retreat from the vicinity of Courtrai. The strategical aim of the great series of battles was now accomplished, for the enemy's line was now split into two parts, one on each side of the great natural barrier of the Ardennes. The pursuit of the beaten enemy all along the line was only stopped by the Armistice.

France, Anatole (Jacques-Anatole Thibault) (1814-1924), the most famous Fr. author of his time, was b. April 16, in a house now demolished, 19 Quai Malaquais, Paris; son of François Noël Thibault—an old soldier, a devout Catholic and fervid monarchist, who kept a bookshop and specialised in rare volumes and manuscripts; and who, when writing bibliophile articles, used the pseudonym 'France Libraire'—'France' being short for François in his native Anjou. Anatole's childhood's acquaintance included a grandfather who had fought at Waterloo, and a grandmother belonging to a still earlier generation. He was sent to the Jesuit Collège Stanislas, where he became strongly attracted to the anc. classics—especially Homer; and he learned mediæval history at the École des Chartes. When he was fifteen, he dedicated to his parents his first literary work, *Le Légende de Sainte Radegonde* (1859). He contributed verse and articles to the smaller reviews: it was in the *Revue théâtrale* that he first signed himself 'Anatole France'—in allusion to his father's pseudonym. For Pierre Larousse's *Grand Dictionnaire* he wrote articles on masterpieces of antique art. His first published volume was *Étude sur Alfred de Vigny* (1863). Later appeared some volumes of his verse. In 1876 he became an assistant in the library of the Senate under Leconte de Lisle. For the publisher Lemerre he wrote a series of 'notices' and introductions for the Fr. classics. In 1879 he published in one volume two little novels, *Jocaste* and *Le Chat Maigre*, which show the influence of Daudet and Dickens. His originality was manifested in *Le Crime de Sylvestre Bon-*

nard (1881), 'a model of prose, harmonious and winged.' *Les Désirs de Jean Servien*, a sad tale of the Commune, came out in 1882. *Le Livre de mon Ami* (1885) is a delightful assortment of childish recollections.

On March 21, 1886, he joined the staff of *Le Temps*, succeeding Claretie as writer of 'Vie à Paris.' The following year he succeeded Scherer as writer of 'Vie littéraire' in the same paper. His conduct of this department illustrated his famous definition of the office of a critic: 'Raconter les aventures de son âme au milieu des chefs-d'œuvre.' In 1889 appeared a volume of stories entitled (from the first of them) *Balthazar*. In 1890 came *Thais*, a story of a courtesan of Alexandria converted by the monk Paphnutius. About 1891 A. F. had a literary dispute with Leconte de Lisle, and was obliged to leave the Senate library. In 1892 appeared *L'Etui de Nacre*, containing fifteen stories that had come out separately in different publications—one of them the famous *Procureur de Judée*. In 1893 he left *Le Temps*; and in the same year appeared *La Rôtisserie de la Reine Pédauque*, 'a story of magic, somewhat baroque, a little too erudite in places,' but introducing the Abbé Jérôme Coignard, who has been called 'the most graciously eloquent of the author's mouthpieces,' and who reappears in *Les Opinions de Jérôme Coignard* (1893). Some change of style is noted in *Le Lys rouge* (1894): a story of passion and jealousy, with characters identifiable in real life, and with picturesque scenes in Florence. A return to meditateness marked *Le Jardin d'Epicure* (1894) and *Le Puits de Sainte-Claire* (1895).

On Jan. 23, 1896, A. F. was elected to the Academy in place of Ferdinand de Lesseps. Soon afterwards the Dreyfus affair became a national scandal, and engaged much of A. F.'s activity for years. It is the main theme of *Histoire Contemporaine*; whose hero, the immortal Monsieur Bergeret, voices the ideas of the author throughout four volumes: *L'Orme du Mail* (1897), *Le Mannequin d'Osier* (1897), *L'Anneau d'Améthyste* (1899), and *Monsieur Bergeret à Paris* (1901). Other works, intervening, are *Pierre Nozière* (1899) and *Clio* (1900). *Crainquebille* first appeared in 1902; the 1904 edition was dedicated to Mme. Arman de Caillavet, who had been the author's inspiration for more than twenty years. About this time he wrote several political works: *Opinions sociales* (1902), *L'Eglise et la République* (1904), and *Vers les Temps*

meilleurs (1907). *Histoire comique*, telling of the neutralisation of a guilty passion by the suicide of the wronged lover—by no means a comic story—came in 1903. *Sur la Pierre blanche* (1905) contains a picture in the manner of H. G. Wells of a future world with no towns. The very well-known *L'Ile des Pingouins* (1908) is a history of modern France in fable, recalling Voltaire. *Les Contes de Jacques Tournebroke* (1908) are simple and pleasing. *Les Sept Femmes de Barbe-Bleue* (1909) is a whitewashing of the character of



ANATOLE FRANCE

Bluebeard after the fashion of modern historians. *La Vie de Jeanne d'Arc* (1908), in two large volumes, expounded the thesis that Jeanne was perpetually under hallucination, of mediocre intelligence, and without military talent—nothing but a tool in the hands of the clergy, partisan to Charles VII. It was not popular.

Les Dieux ont Soif (1912) had appeared serially as *Evariste Gamelin*. It is among A. F.'s masterpieces, reproducing the atmosphere of the end of the eighteenth century. He visited England in 1913, fraternising with his socialist comrades there. *La Révolte des Anges* (1914) is a story of the other world, and of fallen angels become anarchists here below.

In the Great War, A. F.'s occupation being well-nigh gone, he retired to Saint-Cyr-sur-Loire, near Tours. He published *Sur la Voie glorieuse* (1915), a collection of patriotic articles; and he protested against the idea of a peace without victory. But the peace as settled was hateful to him, and made him an anti-

militarist. Of his first marriage, in the eighteen-eighties, with a great-niece of the miniature-painter Jules Guérin, he had a daughter, Suzanne, who married Michel Psichari, Renan's great-grandson, killed in the Great War; and who died leaving a son, Lucien Psichari. In the autumn of 1920 A. F. married Mlle. Emma Laprévotte. In 1921 he received the Nobel prize for literature. His last two works: *Le Petit Pierre* (1918) and *La Vie en Fleur* (1921): were in continuation of his autobiographic, half-true, half-romantic sketches of a past epoch. His eightieth birthday brought him the homage of all the literary world; six months later, Oct. 12, 1924, he *d.* at La Béchelleraie, Saint-Cyr-sur-Loire.

France, Ile de, see MAURITIUS.

Francesca, Pietro (Borghese) (1397-1433), Italian painter, *b.* at Borgo San Sepolcro, Umbria: also called Pietro Borghese. He knew no father, and his mother remained a widow so as to devote attention to his education. He preferred to be known by the name F., in recognition of his mother's devotion. Studied mathematics with rare success, but at fifteen abruptly turned to drawing, in which he quickly excelled. Nothing certain is known of the identity of his masters, but later he came under the notice of Guido Antonio di Montifeltro, Count of Urbino, who employed him on the restoration of his palace and to execute portraits of members of his family. According to Vasari, only two of these portraits have survived the desolation of Italian wars, and both are in the Florentine picture gallery, one being of Battista Sforza and the other of Frederic di Montifeltro. F. is chiefly remembered as a painter in fresco. He visited Rome, where he painted frescoes in the Vatican for Nicholas V. These were immense works, and were reproduced in the Vatican library. They were, however, in poor condition as early as the sixteenth century, when Raphael was commissioned to replace them with his masterpieces. We have therefore somewhat slender evidence of the merit of his work. Vasari states that F. did work in an Augustinian chapel, but this no longer exists, and his most famous fresco works are those in S. Francesco of Arezzo and Borgo San Sepolcro, and the 'Flagellation of Christ' in Urbino Cathedral. Fuller estimates of his powers are founded on the 'Resurrection of Christ,' an oil painting found in an old Augustine convent at Arezzo. It is in the style of Perugino, although inferior to the work of that painter. Tiraboschi, commenting on another paint-

ing attributed to F., 'Dream of Constantine,' praised it for its effects of light and shade, special knowledge of the play of muscles, and magnificence of drapery. But critics aver that most of these qualities are not to be found in the 'Resurrection of Christ,' although it is commonly agreed that the effects of silhouette and the sumptuous treatment of robes do render the work remarkable, and are of themselves sufficient merit to warrant his work receiving much higher appreciation. The education of Bramante as a painter is generally ascribed to F., whose work, like that of the latter, is regarded as having some affinity to the school of Padua. F. is, moreover, also celebrated for revealing an advanced knowledge of perspective. He lost his sight at the age of sixty, but lived till eighty-six.

Francesca da Rimini, a daughter of Guido da Polenta, Lord of Ravenna. She was given in marriage to Giovanni the Lame (Giunciotto or Sciancato), son of Malatesta, Lord of Rimini, when peace was concluded between the houses of Ravenna and Rimini. The elder brother of Giovanni, Paolo the Handsome, was sent to Ravenna to fetch Francesca, and the two fell in love with each other. Giovanni found them together (c. 1285), and killed them both. The story, which has many modifications, is treated in Dante's *Inferno*, and also in literature by Leigh Hunt, Silvio Pellico, and Stephen Phillips, and in art by Ingres, Ary Scheffer, G. F. Watts, and Cabanel.

Francesco di Paula, or **St. Francis of Paola** (c. 1416-c. 1507), a founder of the order of Minimites, *b.* in Calabria, and at an early age entered a Franciscan monastery and later became a hermit. He was joined by several others, and 1436 erected a chapel. In 1474 the community, with Francis as its superior, was confirmed by Pope Sixtus IV. as the Hermits of St. Francis of Assisi, the name being changed to the Minim Hermits of St. Francis of Paola by Alexander VI. He attended the death-bed of Louis VI. of France, and Charles VIII. built him convents at Plessis and Amboise.

Franche-Comté, an old prov. of E. France in Rhone basin. It corresponded to the co. of Burgundy and comprised what now forms the depts. of Doubs, Haute-Saône, Jura, and a portion of Ain. Its capital was Besançon. A rich land, varying in character from the rich, grain-producing valleys of the Doubs and Saône, through vine-clad terraces, to the thickly wooded heights of the Jura Mts., its possession has been

much disputed. Early in its history it formed a part of the kingdom of Burgundy; under the Carolingians it belonged to that of Arles; it then passed from hand to hand, being for a short period a possession of the Fr. king, and at length, on the marriage of Mary of Burgundy to Maximilian, became a part of the Empire. Charles V. gave it to the Spanish branch of his family, but it ultimately became Fr. territory under the Treaty of Nimwegen. After the Revolution the old prov. was broken up. The inhabs. of the F.-C. earned a reputation for themselves as hardy and independent people. Colonies of emigrants from the prov. were to be found in Rome, Milan, Madrid and other European cities.

Franchise: (1) As used synonymously with liberty. F. means a royal privilege conferring exemption from ordinary jurisdiction, e.g. the Chancery Court of the County Palatine of Lancaster, or any other prerogative right granted by the king, such as the right to a manor or lordship, to hold a fair, to have a forest, warren, or fishery, treasure-trove, waifs, and estrays. Such Fs. often arise by prescription assumed to have been founded on some original and lost royal grant. All such Fs. belong to the class of incorporeal hereditaments (*q.v.*). (2) The right of voting for a member of Parliament or councillor of some municipal body. (For the qualifications of county and borough electors *see* ELECTORATE, ELECTIONS.) Generally speaking an action for damages lies for every wilful interference with the exercise of a F. and it is immaterial whether the defendant acted in good faith or under a mistaken notion of duty or not. The historic case of *Ashby v. White* decided that an elector was entitled to sue a returning officer for refusing his vote.

Francia, or **Francesco Raibolini** (c. 1450–1517), an Italian painter, b. at Bologna; originally a goldsmith and engraver of dies for medals, and became mint-master at Bologna, not taking up painting till middle age, when he made the acquaintance of Mantegna. He was much influenced by Perugino and Raphael. Among his works are: 'Virgin enthroned, with Augustine and five other saints' (Bologna Gallery); 'Virgin,' 'Child and St. Anna,' and 'Pieta' (National Gallery, London); 'Virgin' (Munich); 'St. Peter, Martyr' (Borghese Gallery, Rome), and the frescoes in the church of St. Cecilia, Bologna. *See* G. C. Williamson, *Francia*, 1900.

Francia, José Gaspar Rodríguez da (1757–1850), a dictator of Paraguay, b. at Asuncion, of Portuguese origin.

He studied theology at the University of Cordoba de Tucuman, and took his doctor's degree, but later turned to the law, and for thirty years was an able and successful jurist and public official. In 1810 the revolution against Spain broke out at Buenos Aires, and though Paraguay at first opposed the movement, it declared its independence in 1811, and F., who had been a leading revolutionary, was made secretary of the national junta. In 1813 he was made joint consul with General Yegros, in 1814 dictator for three years, and in 1817 dictator for life. His rule was tyrannic, but most beneficial, its leading feature being a system of non-intercourse with other nations.

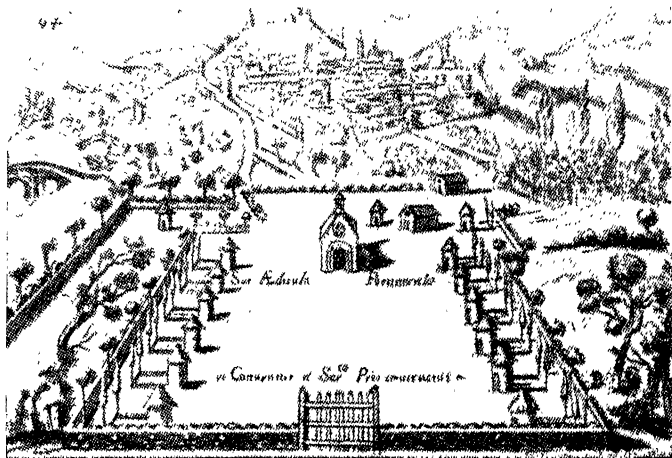
Francis, St., of Assisi (1182–1226), a Rom. Catholic saint, founder of the Franciscan order. He was b. at Assisi in the upper middle class, his father, Pietro Bernardone, being a prosperous merchant of that city. As a youth he was a prominent leader of nightly revels, and fought with great spirit in a petty feud between the towns of Assisi and Perugia. Assisi was defeated, and F. was taken prisoner in 1201, and remained a captive till the following year. The rest enforced by a serious illness in his twenty-second year made him dwell upon his mode of life. On his recovery he attempted to take up arms once more, but was struck down by a second illness at Spoleto. For a time he threw himself half-heartedly into the pleasures of his fellows, though the spiritual conflict was still waging within him. He determined to cast off his old life and to obey implicitly the commands of the N.T. He adopted the attire of a poor mendicant, took a vow of poverty, and devoted himself to prayer and to helping the poor. He went on a long pilgrimage to Rome, and on his return to his native place he worked among the lepers at Gubbio, and gave alms profusely. In spite of the angry remonstrances of his relatives, he continued to walk the streets dressed in the meanest garb, and was frequently pelted with mud by his former companions. At last, in 1206, his father disinherited him publicly, and F., having already united himself to 'holy poverty,' his bride, now renounced his earthly relatives and declared that 'henceforth he had but one Father, Him that is in heaven.'

While praying one day in the ruined chapel of Sta Maria degli Angeli, known as the 'Portiuncula,' or 'little inheritance,' he was visited by a vision, which directed him to his vocation. Clad only in a rough woollen garment, girt with a hempen cord, he went out and preached to the

poor of Assisi, though only a layman. By 1209 he had gathered round him eleven disciples, the first two being Bernard Quintavalle and Peter Cattano. In the following year the band of twelve went to Rome, where they obtained the sanction of Innocent III. to their preaching and their mode of life, his authorisation being formally granted in 1216. On his return to Assisi in 1212, F. drew up the constitution of the order. F. laid greatest stress on poverty, the other vows of the order being chastity and obedi-

he was carried to the Portiuncula, and *d.* on the bare ground. Pope Gregory IX. canonised him in 1228.

The works of F., including hymns, proverbs, sermons, and letters, were printed in folio in 1739. An edition in Latin, with an Italian translation, was published by B. da Fivizzano (Florence, 1880). Consult Sabatier, *Acta Beati Francisci et Sociorum Ejus*, 1902; Brother Leo of Assisi, *Saint Francis of Assisi* (trans. by Sebastian Evans), 1899; Lives by St. Bonaventura, Hase (1856), Mrs. Oliphant



THE PORTIUNCULA, ASSISI, ABOUT THE TIME OF ST. FRANCIS

This illustration is from a print in the *Collis Paradisi* (1704). The largest hut a little to the right of the chapel was the infirmary where St. Francis died, and the one behind was his cell. The other mud huts and the wall were added after St. Francis' death.

ence. Great numbers of disciples flocked around him. F. organised his men and sent them out in bands as missionaries to France, Italy, Spain, and Africa. In 1223 he himself went out to Egypt, and obtained from the Sultan promises of better treatment of Christian prisoners and the guardianship for his order of the Church of the Holy Sepulchre. He had to contend with opposition from Rome, where new regulations had been forced upon his order,* and the vow of poverty, which to him was so essential, had been relaxed. On Sept. 14, 1224, according to the legend told by his biographers, F. received the stigmata of the very wounds of Jesus Christ upon his own person, while praying on Monte Alverno, near Assisi. Two years later, on Oct. 4, feeling that death was drawing near,

(1871), Sabatier (1894), and P. Henry (1903); Barine, *S. François d'Assise et la légende de ses trois compagnons* (Paris), 1901; Butler, *Lives of the Saints*; and Prof. Herkless, *Francis and Dominic*, 1901; G. K. Chesterton, *St. Francis of Assisi* (new edition), 1926; *St. Francis of Assisi, Essays in Commemoration, 1226-1926*, ed. by Walter Seton, 1926.

Francis of Sales, St. (1567-1622), a Rom. Catholic saint and devotional writer, b. of noble family at the castle of Sales, near Annecy, Savoy. After studying at the colleges of La Roche and Annecy, he entered the school of Jesuits in Paris (1578) and subsequently studied civil law in Padua (1584-91). Soon after taking orders, he went on a missionary expedition to the Calvinists of Chablais, and met with great success. Several

attempts to murder him were frustrated. He was appointed to the bishopric of Geneva in 1602. He founded a congregation of nuns of the Ordre de la Visitation, of which his friend Madame de Chantal became first superior. His chief work, *Introduction à la Vie Dévote*, published 1609, has been translated into most European languages. He also wrote a *Traité de l'Amour de Dieu*, and *Entretiens* (published posthumously). See the edition of Migne (1861), and Lives by his nephew, Charles Auguste de Sales (1635) and Hamon (1856), and Mrs. Lear's *Christian Biographies*, 1877.

Francis I. (1745-65), Emperor of Germany, the eldest son of Leopold, Duke of Lorraine, *b.* in 1708. He succeeded to the dukedom in 1729, but in 1735, at the end of the Polish War of Succession, he received Tuscany in exchange for Lorraine. In 1736 he married Maria Theresa, who succeeded her father, Charles VI., to the dominions of Austria in 1740.

Francis II. (1792-1806), Emperor of Germany, and Francis I. (1806-35), Emperor of Austria, the son of Leopold II., *b.* at Florence in 1768. War broke out with France at the time of his accession, and the young ruler had also to be prepared against attacks from Russia and Turkey. By the peace of Campo Formio (1797) he exchanged the Netherlands and Lombardy for Venetia and Dalmatia. In 1804 he assumed the title of Emperor of Austria, which was confirmed by the Confederation of the Rhine in 1806, when he abandoned the title of Holy Rom. Emperor. By the Treaty of Vienna (1809), Austria lost further territories to France, but was victorious at the Battle of Leipzig (1813), and by the Treaty of Vienna (1815) her position in Europe was firmly established. During the remainder of his reign, F. had an able minister in Metternich, and became very popular with his subjects. See Baron J. A. Helfert, *Kaiser Franz*, 1867, and Meynert, *Franz I.*, 1871-73.

Francis I. (1515-47), King of France, the successor of his uncle and father-in-law, Louis XII., and the son of Charles Comte d'Angoulême, *b.* at Cognac in 1494. Immediately after his accession he recaptured Milan, and in 1516 signed a concordat with the Pope by which the Fr. crown acquired extensive church privileges lost only at the Fr. Revolution. On the death of Maximilian (1519), F. was a rival claimant of Charles of Spain to the Imperial crown, and after the election of the

latter, F. prepared for Henry VIII. the 'Field of the Cloth of Gold' (1520), but was unsuccessful in securing an alliance with England. The Holy See, Venice, and the Powers united to drive France out of Italy, and in 1525 F. was defeated at Pavia and taken captive to Madrid. War



FRANCIS I.

continued till 1529, when, by the Treaty of Cambrai, F. lost his Italian possessions, but retained Burgundy. Hostilities were renewed against Charles V. (1534), the war concluding with the Peace of Crespy (1544). Consult Gaston Paris, *François I.*, 1888, and Julia Pardoe, *The Court and Reign of Francis I.* (new ed.), 1887.

Francis II. (1559-60), King of France, eldest son of Henry II. and Catherine de' Medici, *b.* at Fontainebleau in 1544. He married Mary Stuart, Queen of Scotland (1558), whose uncles, the Duke of Guise and Cardinal of Lorraine, virtually ruled during F.'s brief reign.

Francis, John (1811-82), an Eng. publisher, *b.* in London. He entered the office of the *Athenæum* as a clerk in 1831, and in two months became its business manager and publisher, which position he retained till his death. He was also business manager of *Notes and Queries* from 1872 to 1882. The 'John Francis Pensions' of the Newsvendors' Benevolent Institute were founded to his memory. See C. J. Francis' Life, 1888.

Francis, Sir Philip (1740-1818), politician, after being for some years in the civil service, he went in 1774 to India as a member of the council of the Governor-General. There he was a bitter opponent of Warren Hastings,

with whom in 1779 he fought a duel and was wounded. He returned to England in the following year with a considerable fortune, and entered Parliament. He still took an active interest in Indian affairs, and in 1787 assisted Burke and the managers of the impeachment of Hastings to prepare their charges. He is best known as the reputed author of the *Letters of Junius*, and he is to-day generally regarded as the writer of those papers, but there has never been produced any definite evidence as to the truth of the assumption.

Franciscans, or Friars Minor (Lesser Brethren), are a religious order of the Rom. Catholic Church founded in 1208 by St. Francis of Assisi. The order was founded, like all the early orders, on the three-fold vow of chastity, poverty, and obedience. St. Francis laid special stress upon the vow of poverty, so that it was not only forbidden to individuals to possess riches, but also it was unlawful for the community to possess property. The vow of poverty was extremely stringent; the members of the order did not even possess the clothes that they wore. The order grew rapidly, but the stringent poverty enjoined occasioned much dissension. During the life of St. Francis his authority was sufficient to prevent any modifications of his rule, even after he had abdicated from the post of minister-general of the order. After his death his successor, Brother Elias, attempted to institute changes, but a reaction set in towards St. Francis' ideals. Many years of dispute followed, and the order was split into three parties. Under Pope Leo X. two separate divisions were made in the order: the Conventualists, who by a papal dispensation were released from the extreme poverty of the order as inaugurated, and the observants, who were strict followers of St. Francis. In 1528 Brother Matteo formed a new division called Capuchins, because of the peculiar peaked hood which they wore. The Capuchins claim to be the closest followers of St. Francis. The F. are under a democratic form of gov. The final authority is vested in the 'general' who resides in Rome. Under him are the 'provincials,' each presiding over all the brethren in a province. The head of each monastery is called the 'Custos,' or Guardian.

The Conventuals, Observants, and Capuchins constitute the 'First Order.' The 'Second Order' consists of nuns, the nuns of St. Clare or 'Poor Clares,' the Capuchinesses, the Urbanist nuns, etc. The 'Third

Order' or 'Tertiaries' consists of members who live in society, not taking the vow of celibacy, but are bound by the spirit of the rule of the order. More recently certain active congregations of men and women have adapted the principles of the Tertiaries to a conventual régime and are known as the Conventual Third Order. The F. have been foremost in foreign missionary work, and throughout all their internal dissensions they have faithfully continued St. Francis' work of ministering to the poor. There are many notable names in the order. Most of the great English theologians were F., as for example: St. Bonaventure, Alexander of Hales, Duns Scotus, William of Ockham. In the world of letters Roger Bacon was a prominent member of the order. Of the popes, Nicholas IV., Alexander V., Sixtus IV., Sixtus V., and Clement XIV. were F. The F. reached England in 1220. At the Reformation there were sixty-five monasteries in England. After the dissolution of the monasteries the order was restored by the foundation of an Eng. convent in Douay in 1617. There are now twelve houses in Great Britain, and seventeen in Ireland. See Wadding's *Annales Fratrum Minorum*.

Francis Ferdinand of Austria, Archduke (1863-1914), a nephew of the former Emperor of Austria, the son of Archduke Charles Louis, b. at Graz. After the suicide of Prince Rudolf (1889), he became heir-apparent, but in 1900 the archduke made amorganatic marriage with Countess Sophia Chotek, created Princess von Hohenberg, and renounced the right of his future children to the thrones of Austria and Hungary. His assassination at Serajevo on June 28, 1914, was the immediate cause of the rupture between Austria-Hungary and Serbia which brought on the Great War. Very various opinions of his powers as an administrator are held. His education, like that of the sons of Archduke Otto and of the princes of the House of Hapsburg-Lorraine, generally was not of a kind to fit him for the task of government. But F. F. is credited with a quick grasp of essentials and a good memory, which helped to supply the defects of education. In his administration in Bosnia he showed at times extreme obstinacy, and at other times that he could be easily influenced. It is probable that he was fully alive to the importance of settling the S. Slav question, and in a way which should commend itself both to Austria and to Hungary, for he would have gone as far as to postpone his own coro-

nation as Emperor of the Dual Monarchy until the two halves of the empire were in accord on this great question. High hopes had been entertained both in Austria-Hungary and in Germany on him. The Catholics favoured him for his piety, the Ger. people for his loyalty to the Ger. alliance, and his own people because his obvious patriotism and vigorous if unimaginative fulfilment of his administrative duties promised well after the aged Franz Ferdinand should pass away. But there is no doubt that he was intensely disliked by the Serbs and Bosnians. This is easily explained by the belief that he was the protagonist in a project to unite the Bosnian Serbs and Croatia-Slavonia with Austria and Hungary into a triple monarchy, a project which involved Austro-Hungarian opposition to any further territorial expansion of the two independent Serbian kingdoms lest such complications should thereby be introduced as would render the project impracticable. For this reason all patriotic Serbs and Montenegrins from 1908 to 1914 organised secret societies in the S. Slav countries and disseminated propaganda to further the object of severing all the S. Slav peoples from the Hapsburg Empire. It is therefore not surprising that, the official Austrian investigation into the murder of F. F. and of his wife by youthful Serbian conspirators having established that the outrage was at the instigation of secret revolutionary societies and with the connivance of Serbian gov. officials, intense indignation was aroused among both Ger. and Magyar elements in Austria-Hungary, who saw in the murder, and not without reason, a shattering blow at the very existence of the Dual Monarchy. Equally, however, the welfare of the Serbs appeared in those days to be bound up with that of Russia; wherefore the murder of a relatively obscure archduke gave rise to a crisis which was soon destined to lead to a world conflagration.

Francis Joseph (1830-1916), Emperor of Austria, the eldest son of Archduke F., b. at Vienna. He received instruction in the various languages of the heterogeneous Austrian monarchy and became emperor in 1848 on the abdication of his uncle, Ferdinand I. At this time Hungary was in a state of open revolt, and declared itself a republic in the course of the following year, with Kossuth as governor. However, aided by Herr von Brück, Francis inaugurated a series of fiscal and commercial reforms favourable to

the interests of the middle classes. In 1853, the emperor tried without success to induce the Czar Nicholas to abandon his designs against Turkey, and in 1859 he had to face a war with France and Sardinia, ending in the loss of Lombardy. It was at the conclusion of this war that Francis Joseph began the necessary work of reform and abandoned his conservative policy. In 1866 began the disastrous seven weeks' war with Prussia, and at the battle of Sadowa, the question of the headship of Germany was decided. It was inevitable that the relations of



THE EMPEROR FRANCIS JOSEPH

Austria and Hungary should be rearranged and a reconstruction of the monarchy on a dualistic basis was effected by the 'Ausgleich' of 1867, the Emperor Francis Joseph being crowned at Pesth. This form of monarchy existed up to the time of the Great War. In spite of numerous difficulties, and discouraging political conditions, the emperor, by his personal influence, succeeded in holding his dominions together. Francis Joseph married Elizabeth of Bavaria in 1854, who was assassinated in 1898, and their eldest son, Rudolph, dying in 1889, the Archduke Charles Francis Joseph became heir presumptive; but was in his turn murdered (see CHARLES FRANCIS JOSEPH; SERAJEVO). It may be conceded that he strove in his long reign to maintain a constitutional and parliamentary régime in Austria-Hungary; but, though he reigned for sixty-eight years, memories of this aged emperor faded away with astonishing rapidity as events in the Great War followed one another in swift succession. Cold, impersonal and surrounded by

reactionary advisers, he was by no means popular, and it was often prophesied before the Great War that, on his death, the last hour would also sound for his empire. His last illness overtook him in the Palace of Schönbrunn near Vienna at the beginning of Nov. 1916, as the Austro-Hungarian and Ger. armies, fresh from victory at Cronstadt and Hermannstadt, were overrunning Rumania. Yet even when it was clear that his days were numbered, his sense of duty compelled him to perform his daily work as though he were in his customary good health. He lingered thus for some ten or eleven days, and even when it seemed he could scarcely outlive the day, the dawn of Nov. 21 found him seated once more before his writing table. But by evening of the same day he died. In the expectation of a crisis, the Archduke Charles had been recalled from the Rumanian front, but no crisis occurred, and Charles, grand-nephew of F. J., was crowned with every mark of popular and cordial acquiescence. The collapse of the empire, however, was a reality less than two years later. See Henri de Weindal, *The Real Francis Joseph*, and Auerbach's *Les Races et Nationalités en Autriche-Hongrie*; Glaise-Horstenau, *Collapse of Austria-Hungary*, 1930.

Francis of Paola, see FRANCESCO DI PAULA.

Francis Xavier, see XAVIER.

Franck, César (1822-90), a Belgian composer and organist, naturalised Fr. in 1870. After an academic career of unusual brilliance, he began an arduous life of composition and teaching, a life which, although uneventful, was destined to bear great fruit. F. gathered together a circle of young, eager students, including such names as d'Indy, Chaussou, Leku and Duparc, and with them pursued the study of polyphonic and symphonic music; he may, indeed, be called the father of modern Fr. music, a great and glorious distinction. His compositions abound in rich and beautiful harmonic innovations, and (except for some early insincere works which are fortunately forgotten) are imbued with a spirit of deep reverence and mysticism, particularly the wondrous oratorio *Les Béatitudes*, 1870, and the D Minor Symphony, 1889. His orchestration and treatment are masterful to a degree; and the concerted works for piano and orchestra are full of poetry and romantic charm. In chamber music, besides the famous piano quintet (1880), and the string quartet in D (1889), he has left the superb violin and piano sonata in

A (1886), regarded by many critics as the finest ever written. Pianists and organists are also indebted to him for several very fine solo compositions.

Franck, Sebastian (1499-1542), a Ger. writer, b. at Donauwörth. He took priest's orders and held a curé in 1524 near Augsburg, but soon after became a follower of Luther. In 1528 he published a *Treatise Against the Horrible Vice of Drunkenness*. This work was very popular. He soon, however, drifted away from the school of Luther, and was banished from Strassburg in 1531 owing to the freedom and independence of his views, and especially because he advocated religious toleration in his *Chronica*. He went to Esslingen first, but in 1532 settled at Ulm as a printer, and was banished from this city on the publication of his *Paradoxa* in 1534. He also wrote *Weltbuch*, 1534, a supplement to his *Chronica*, and had printed, in 1541, a collection of proverbs. His historical writings are distinguished for their justness and love of truth, and he is famous as being one of the earliest masters of Ger. prose.

Francken (sometimes Franck). A Flemish family of painters, in four generations, beginning with *Nicolaes* (?1520-1596). His three sons who painted were *Hieronymus I.* (1540-1610), *Frans I.* (1542-1616), and *Ambrosius I.* (1544-1618). The next generation was three sons of Frans I., viz.—*Hieronymus II.* (1578-1629), *Frans II.* (1581-1642), and *Ambrosius II.* (d. 1632). The generation after that supplied *Frans III.* (1607-1667) and *Hieronymus III.* (1611-?), sons of Frans II. The list is completed by *Constantius* (1661-1717), son of Hieronymus III. The foremost in fame is Frans I. All the family, except Constantius, painted biblical scenes chiefly—Constantius painted sieges and battles. They were all born in or near Antwerp. Frans I. learned at the school of Frans Floris; his father Nicolaes also is said to have learned there; and the rest of the family painted very nearly in the same style. Ambrosius I. had more faults (but also a livelier merit) than his more famous brother; and the latter is, besides, considered inferior to his own son, Frans II., called 'Don Francisco.' The other Flemish painters named Francken belong to other families—the chief being: *Sebastien* (or *Franer*) (1578-1647), who painted battles; and his son *Jan Baptist* (1599-1653), an exquisite painter of interiors.

Franco-German War, The. This famous war arose out of the candida-

ture of a Hohenzollern prince for the throne of Spain, but was mainly due to the intense jealousy that was excited in France by Germany's rise as a military power, consequent on the defeat of Denmark in 1864 and of Austria in 1866. Though the Hohenzollern candidature was withdrawn, the Fr. emperor, Napoleon III., was not satisfied, and required his ambassador Benedetti to obtain an assurance from the King of Prussia that it would not be repeated. The interview between the Fr. ambassador and the King of Prussia was reported by Bismarck in such a way as to make it felt in France that a national insult had been received, and war was declared (July 15, 1870). Napoleon had hoped that the S. Ger. states would not support Prussia, and intended to advance into Ger. in order to force them into neutrality. In spite of the assurance of the Fr. War Minister that the army was ready, it was found that no adequate preparations had been made. On the contrary, the Ger. army was in the highest state of preparation, and by the end of July more than half a million men had been mobilised on the Fr. frontier. The Fr. could only offer an opposition of some 250,000 men, inferior in artillery and equipment. The Ger. army was divided into three corps, under General Steinmetz, Prince Frederick Charles, and the Crown Prince, respectively, while the Fr. formed two armies under Bazaine near Metz, and MacMahon in the E. Vosges Mountains. The first fight was at Weissenburg on Aug. 4, and the Prussians rapidly gained the Battles of Woerth over MacMahon and Forbach over Frossard, thereby preventing the junction of the two Fr. armies. Bazaine's army retired to Metz, where its further retreat was prevented by the Battles of Rezonville, Gravelotte, and St. Privat, while MacMahon marched on Sedan, where he was defeated and compelled to surrender, Napoleon being also taken prisoner. The Ger. armies then hurried on to Paris, which was invested on Sept. 19. In spite of the desperate efforts of the Gov. of National Defence under Trochu, Favre, and Gambetta, which succeeded the Empire, disaster followed on disaster. Bazaine surrendered at Metz on Oct. 27 with 100,000 men. General D'Aurelle de Paladines gained the Battle of Coulmiers near Orleans over the Gers., but was subsequently defeated at Artenay, Loigny, and Patay. General Chanzy succeeded in holding the Gers. in check around Le Mans, but Bourbaki's attempt to create a diversion

by an invasion of Germany signally failed, and his army was forced over the Swiss frontier, where it had to lay down its arms. On Jan. 28, 1871, Paris capitulated, and peace was signed on May 10, at Frankfurt-on-Main, by which France ceded Alsace-Lorraine and agreed to pay an indemnity of 5000 millions of francs. The last stages of the war were marked by the revolutionary outburst of the communists in Paris, quelled by the regular army on May 20.

Francolin, the name given to birds of the genus *Francolinus*, which belong to *Perdiciinae*. They belong to the Ethiopian region, Arabia, Asia Minor, India, and S. China, and like the common partridge feed on insects and seeds. See PARTRIDGE.

Franconia, an old duchy between Upper Saxony, the Upper and Lower Rhine, Swabia, Bavaria, and Bohemia, which has been regarded as the original home of the Franks. At the close of the fifth century it was conquered by Clovis, King of the Salian Franks, and at a later period came under the rule of Charlemagne. After the Treaty of Verdun in 843, it was the centre of the Ger. kingdom and was divided into counties which were ruled over by counts. Conrad, who was Duke in F. about 906, was chosen Ger. king in 911. Shortly afterwards, F. became immediately subject to the imperial crown, and the region itself was split up into a great number of lordships, countships, and ecclesiastical domains, these last belonging chiefly to the Bishops of Würzburg, Worms, Spire, Bamberg, and Mayence. These bishops were very powerful, and in 1268 the Bishop of Würzburg successfully asserted his claim to the title of duke in East F. In 1501 Maximilian I., when dividing the empire into circles, restricted the title F. to a circle which included Würzburg, Bamberg, Eichstätt, the Abbey of Schöenthal, the district of Mergentheim, and the principalities of Bayreuth and Anspach. The name, however, fell in abeyance after 1806, but was revived in 1837 by Louis I., King of Bavaria, who gave the names of Upper, Middle, and Lower F. to the three N. portions of his kingdom.

Francs-tireurs (freshshooters), bands of Frenchmen, mainly peasants, who took up arms against the Ger. invaders during the Franco-Ger. War. They indulged in guerilla warfare and were not recognised by the Gers. as regular combatants, being summarily shot when captured. Towards the close of the war Gambetta organised them, when they were treated by the Gers. as regular combatants.

Franecker, a tn. in the prov. of Friesland, Holland, 5 m. from Harlingen. It was the seat of a university from 1585 to 1811, and possesses a town hall dating back to 1591, which contains a 'planetarium' made by Eise Eisinga, 1774-1881. The chief industries are silk-weaving, shipbuilding, and the manuf. of woollen goods and pottery. Pop. 8000.

Frank, Leonhard, Ger. author; b. Sept. 4, 1882, at Würzburg. Lives in Berlin. His first book was *Die Räuberbande* (1913), in which was noted 'strong original local feeling, fine and bold psychology of youth.' *Die Ursache* (1915) is a bitter attack on schoolmasters, psycho-analytic. *Der Mensch ist gut* (1917) expressed in war-time the strongest antipathy to war and conscription. From the subordination of artistic form to political tendency he is said to have emancipated himself in later books—e.g.: *Der Bürger*, 1924; *An der Landstrasse*, 1925; *Die Schicksalsbrücke*, 1925; *Im letzten Wagen*, 1925; *Das Ochsenfurter Männerquartett* (humorous), 1927; *Karl und Anna*, 1928 (dramatised, 1929); *Bruder und Schwester*, 1929. He was elected to the Ger. Academy of Letters, 1928.

Frank-almoigne, or **Free-alm**s, the name given to a system of tenure in Anglo-Saxon times whereby a religious corporation held land. The ordinary feudal conditions were not imposed, but those who held land in F. were bound before God to make prayers, orisons, and masses for the souls of their grantor. See **TENURE**.

Frankau, Gilbert (b. 1884), Eng. novelist, son of Julia F. ('Frank Danby'), also a novelist. His best novels are *Peter Jackson*, *Cigar Merchant*, 1919; and *Masterston*, 1926. Has also written some verse.

Frankenberg, a tn. of Saxony, in the circle of Zwickau, 7 m. from Chemnitz. It is an important industrial centre, and has extensive woollen, cotton, and silk manufactures, calico printing, and dyeing works; cigars are also made. The church was restored in 1874-75, and there are numerous educational establishments. Pop. 13,600.

Frankenhausen, a tn. of Germany in Schwarzburg-Rudolstadt, situated on the Little Wipper, 27 m. N.N.W. of Weimar, and 36 m. N.N.E. of Gotha. A battle was fought here in 1525, and the peasants suffered defeat by the Saxon, Brunswick, and Hessian troops. The manufs. are pearl buttons, cigars, and sugar; there is a salt mine and brine springs. Pop. 7000.

Frankenstein, a tn. of Silesia, Prussia, in gov. of Breslau, situated

on a trib. of the Neisse, 45 m. S.W. of Breslau. It is an industrial centre, with manufactures of hats, woollen, cotton and linen goods, chemical and salt works, and also an extensive trade in corn. Pop. 10,000.

Frankenthal, a tn. of Bavaria in the Palatinate prov., situated on the Isarnach, 8½ m. N.W. of Mannheim, and connected with the Rhine by a canal. It manufactures machinery, printing presses, boilers, furniture, wooden ware, etc., and has engineering works, breweries, bell foundries, and sugar factories. It possesses some fine public monuments and there are a lunatic asylum and a deaf and dumb institution. Pop. 25,000.

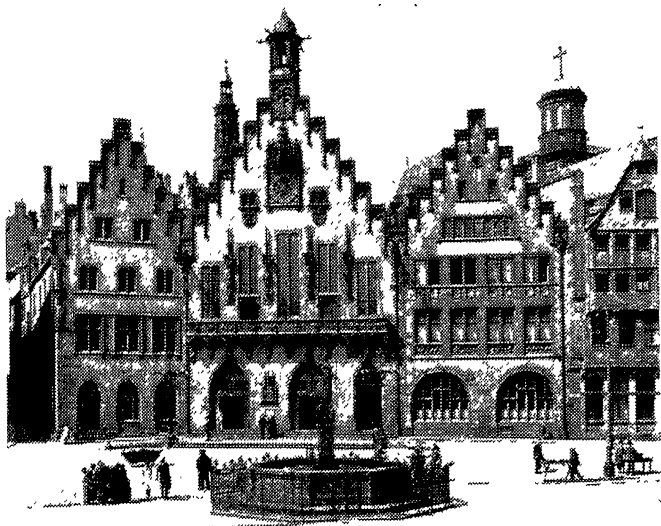
Frankenwald, a mountainous dist. of Germany, situated principally in the N.E. of Bavaria on the borders of the Thuringian states. It forms a link between the Thüringer Wald and the Fichtelgebirge range. In form it is an undulating plateau of about 2000 ft. elevation.

Frankfort: (1) A city of Kentucky, U.S.A., and the cap. of Franklin co., and also of the state. It is situated on the Kentucky R., which is navigable for 40 m. from the city. The principal manufactures are boots and shoes, twine, furniture and carriages; a considerable trade in lumber is carried on and there are flour mills and cotton factories. Thoroughbred trotting horses are raised in the vicinity. F. possesses a town-hall, the fine state Capitol, state penitentiary, the St. Joseph's Academy, the state institution for feeble-minded children, a state normal school for coloured, and a state library with over 100,000 vols. It is served by three railways. Pop. 11,626. (2) Also the co. tn. of Clinton, Indiana, U.S.A. It is situated at the intersection of several railways, 40 m. from Indianapolis. There are large machine-shops and manufactories of agricultural implements, brick-making machinery, etc. The town is supplied with natural gas. Pop. 12,196.

Frankfort-on-the-Main, a tn. in the prov. of Hesse-Nassau, Prussia, on the Main, about 23 m. from its confluence with the Rhine at Mainz. The name means 'ford of the Franks,' and it is said that this place was shown to Clovis, King of the Franks, by a deer, when he was leading an expedition against the Alemanni in 496. At any rate, the town is mentioned in a document as early as 793, and seems to have been of some importance, for Charlemagne, having crossed the river here when he was leading a campaign against the Saxons, built a hunting-seat, which was enlarged into a royal palace by Louis the Pious, who surrounded the

town with walls in 838. After the Treaty of Verdun in 843, it became the head of the E. Frankish empire, and from 1152 it was the place for the election of the Ger. emperors. From 1815 to 1866 it was the seat of the Diet of the Ger. Confederation. It is also interesting because it contains the house where Goethe was born, as well as the cathedral in which the Rom. emperors were formerly elected, founded in 852 by King Louis the Ger. Other notable buildings are the Römer, which contains the election chamber, where the Ger. kings

a scheme for a waterway to the Weser, thus linking F. with Bremen. F. is connected by railway with all the important cities of S. and Central Germany, and is very important as a centre of trade. It was formerly the principal seat of banking and exchange in Germany, and is now only second to Berlin, and is still remarkable for the large business that is done in gov. stock. Publishing and printing, brewing, and the manufacture of quinine are carried on in the suburbs of Sachsenhausen and Bockenheim, and the town also produces



FRANKFORT

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The Romenberg or Market Place

were chosen, and the emperors' hall, where the coronation festival was held; the Saalhof, which is the oldest building in F.; the Thurn-und-Taxis palace, the place of meeting of the former Diet; and the Haus zum Braunsfels, or exchange. It also possesses an interesting bridge, Alte Mainbrücke, made of red sandstone, which dates back to the fourteenth century. The Main has been dredged and now affords heavy barge traffic with towns of the Upper Main and the Rhine. It is now an important inland port. The Rhine-Main-Danube Canal is under reconstruction and there is

fancy goods, hats, machinery, soap and perfumery, ready-made clothing, jewellery and metal wares, and chemicals. Cider, too, is largely manufactured, and the trade in leather is of great and growing importance. Two large fairs are held in the town, one in the spring and one in autumn. The *Frankfurter Zeitung* is an important Liberal organ. In 1914 the university was founded, also an academy of labour. F. was bombed during the Great War several times and in 1920 was occupied by the Fr. for a short period. Pop. 466,000.

Frankfort-on-the-Oder, a tn. in the prov. of Brandenburg, Prussia, on the Oder, about 50 m. S.E. of Berlin. It contains the Evangelical Marienkirche (Oberkirche), built in the thirteenth century; the Rathhaus, dating from 1607, and a monument to the poet Kleist, who was b. in this town. The university of F., founded in 1506, was removed to Breslau in 1811. The town is an important railway centre, and has a large garrison. There are extensive coalfields in the neighbourhood. Its chief industries are the manufactures of tobacco, potato-starch, earthenware, machinery, metal ware, chemicals, paper, leather, sugar, and iron and steel goods. Pop. 70,000.

Frankincense, or *Olibanum*, a gum-resin obtained from certain species of trees of the genus *Boswellia*, of the order Buseraceae. It is gathered from the trees from May till September by means of a deep incision made in the trunk, from which it exudes, hardening by exposure to the air. It occurs in round or oblong tears covered with a white dust, and is of a yellowish-brown colour, but some is colourless. It has a bitter taste, and smells like balsam when heated. It burns with a bright flame and fragrant odour, and is used in incense, fumigating powders, and in the composition of stimulating plasters, etc.

Franking of Letters, a term used for the right of sending letters free of charge. This privilege was claimed by the House of Commons in 1660, but it was not until 1764 that an Act was passed which made the practice legal. After this date every member of parliament was allowed to send ten letters a day free of charge, and to receive fifteen. The privilege was abused, and was finally abolished in 1840, on the introduction of the penny postage. In the U.S.A. franking was instituted in 1776, and remained in force until 1873; was then abolished, but later restored, and is now in flourishing existence, officers of the U.S.A. gov. and members of Congress being allowed to send any quantity and weight of mail matter free. The frequent abuse of this privilege is causing agitation for its abolition.

Frankland, Sir Edward (1825-99), an Eng. chemist, b. at Churchtown, near Lancaster. He first attended the grammar school at Lancaster, but in 1845 came to London, and afterwards worked under Bunsen at Marburg. In 1847 he was science master at Queenswood school, and in 1851 Professor of Chemistry at Owen's College, Manchester. He was also lecturer in chemistry at St. Bartholomew's Hospital for a time, and

in 1863 Professor of Chemistry at the Royal Institution. He devised new methods of water analysis, publishing on this subject *Water Analysis for Sanitary Purposes*, and when appointed a member of the Royal Commission on the pollution of rivers in 1868 did good work. He discovered the 'theory of valency,' and jointly with Sir Norman Lockyer was responsible for the conclusion that the external rays of the sun are composed of gases and vapours, as well as for the discovery of helium.

Frankland, Percy Faraday (b. 1858), an Eng. chemist, b. in London. He was educated at University College School, the Royal School of Mines, and Würzburg University. He was demonstrator and lecturer in chemistry, Royal School of Mines (1880-88); Professor of Chemistry, University College, Dundee (1888-94), Mason College, Birmingham (1894-1900), and Birmingham University since 1900. He was formerly examiner in chemistry to the London University, and was made president of the Chemical Society in 1911. He has done much research, and his memoirs—published in the *Philosophical Transactions Royal Society*, etc., dealing with chemical aspects of fermentation, the application of bacteriology to air, water, and the sand filtration of water, and the bacterial treatment of sewage—show in what direction. He also published *Agricultural Chemical Analysis*, 1883; *Our Secret Friends and Foes*, 1894; *Micro-organisms in Water*, 1894; *Life of Pasteur*, 1897, besides many other articles on fermentation, etc.

Franklin : (1) A tn. in Norfolk co., Massachusetts, U.S.A., about 27 m. S.W. of Boston. It has a public library containing books contributed by Benjamin F., in whose honour the town received its name. The chief manufs. are straw goods, felt, cotton, and woollen goods, rubber shoes, and pianos. Pop. 7023. (2) A city in New Hampshire, U.S.A., about 95 m. from Boston, at the confluence of the Pemigewasset and Winnepesaukee rivers to form the Merrimac. The rivers furnish good water power, which is extensively used in the manufs. The chief are : paper and pulp, hosiery, saws, needles, and knitting machines. Daniel Webster was born here, and the house is used as a museum. F. was first settled in 1748 and incorporated as a city in 1895. Pop. 6576. (3) A tn., cap. of Venango, Pennsylvania, U.S.A., about 35 m. from Erie. It is the centre of the chief oil region of the state, and manufs. boilers, engines, steel castings, iron goods, lumber,

bricks, and flour. Fort F. was built by American soldiers in 1787 but abandoned in 1796 for a stronger fortification. A town was established here in 1795, incorporated as a borough in 1823, and as a city in 1868. Pop. 10,254. (4) A dist. in N. Canada, named after Sir John F., which includes Banks, Prince Albert, Victoria, Wollaston, King Edward and Baffin Land, Melville, Bathurst, Prince of Wales, and Cockburn Islands. Its area is about 500,000 sq. m.

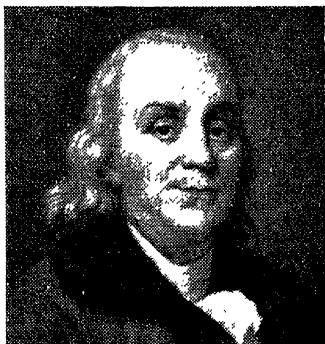
Franklin, Benjamin (1706-90), an American statesman, b. in Boston, Mass., on Jan 17. He was the fifteenth child in a family of seventeen, and therefore after two years at school he was apprenticed as a printer at the age of twelve. He learnt his trade thoroughly, and at the same time became acquainted with the work of editing a newspaper. In 1725 he sailed for England, where for eighteen months he worked in a printer's office. On his return to America he started business as a printer. In 1729 he bought the *Pennsylvania Gazette*, and was so successful in editing the paper that three years later he brought out *Poor Richard's Almanac* which he continued to issue for twenty-five years and became famous in the American colonies because of Franklin's pithy maxims on the virtue of thrift and hard work.

About this period of his life he made many scientific investigations. He established the identity of lightning with electricity, by means of his famous demonstration with a boy's kite, and suggested the use of lightning conductors on large buildings. Amongst his scientific researches, two very useful pieces of work were: the discovery of the Gulf Stream and of its course, and the discovery of the course of the storms that cross the continent of N. America.

He began to take a prominent part in the political life of Pennsylvania. In 1737 he was postmaster of Philadelphia and from 1751-64 was a member of the colony's legislative body. As early as 1754 he was ardently advocating an inter-colonial union, the better to present their claims to the English government. In 1757 he was drawn away from his scientific work by the urgency of the political situation in Pennsylvania. In that year he was sent to London to represent the grievances of the colony with regard to taxation. In that mission he was so successful that in 1771 he was again sent, this time to protest against the Stamp Act. In 1775 he returned to America and helped to draw up the Declaration

of Independence. During the War of Independence he represented the states in Europe. In 1778 he was recognised as Minister of the U.S.A. by France. He brought about the Treaty of Paris, and was instrumental in obtaining a good deal of help for the states. It was mainly through his diplomacy that France was brought into the war. At the close of the war he remained in Paris as Minister of the States, and then returned to take part in paying the constitution of the new nation.

Bigelow has edited a complete edition of F.'s works. Except for his



BENJAMIN FRANKLIN

early journalistic writings and his famous autobiography these are mainly in the form of private letters. Even his scientific discoveries were made known to the world through his letters to his friends. His autobiography was edited by Bigelow and published in 1868.

Franklin, Edward Curtis, American chemist, b. March 1, 1862, at Geary City, Kan., son of Thomas Henry F. Graduated, 1888, at University of Kansas; served there as assistant in chemistry, 1888-93; Associate Professor, 1893-9; Professor of Physical Chemistry, 1899-1903. Had studied in Berlin, 1890-1; and at Johns Hopkins University, Ph.D. 1894. Went to Leland Stanford Junior University in 1903 as Associate Professor; attained his present post of Professor of Organic Chemistry there, 1906. Member of U.S.A. Assay Commission, 1906; Professor of Chemistry, U.S.A. Public Health Service, 1911-3; consulting chemist, Ordnance Bureau, U.S.A., 1918.

Franklin, Sir John (1786-1847), an Arctic explorer, was b. at Spilsby in Lincolnshire. He entered the

royal navy on board the *Polyphemus*, and took part in the Battle of Copenhagen in 1801. Two months later he was appointed midshipman to the *Investigator*, under Captain Matthew Flinders, and showed remarkable ability for nautical observations on the voyage to Australia. He was present with Commodore Dance in his engagement with Linois in 1804, and took part in the Battle of Trafalgar in 1805. Two years later he joined the *Bedford*, and sailed in that ship in the expedition against New Orleans in 1814, where he was wounded. In 1818 he was appointed to command the *Trent*, and accompanied Captain Buchan in a voyage of discovery in the Arctic regions. In 1821 he was elected a fellow of the Royal Society. From 1825 to 1827 he was again occupied in exploring the Arctic regions, and on his return to England was knighted. In 1845 he set out in the *Erebus* with Captain Crozier in the *Terror* to discover a N.W. passage to the Pacific. The ships were last seen near the entrance to Lancaster Sound, and no traces of the party were found until 1851; F., however, showed the existence of the N.W. passage, and his work resulted in the discovery of a second N.W. passage in 1850.

Franklin, William Buel (1823-1903), American general; b. Feb. 27, at York, Pa. Graduated West Point, 1843. With Wood in Mexican war. Assistant Professor Natural and Experimental Philosophy, West Point, 1848-52. Chief, Construction Bureau of Treasury Dept., Mch. 1861. General of volunteers, May 17, 1861; in first battle of Bull Run. Divisional commander, army of the Potomac. Brigadier-general in regular service, June 30, 1862. Major-general of volunteers, July 4, 1862. Commanded 6th corps, army of the Potomac—Crampton's Gap and Antietam. Suspended on charge of disobedience (towards Burnside) when commanding left div. at Fredericksburg. Towards end of war, commanded 19th Army Corps; wounded at Sabine Cross Roads. Major-general of regulars, March 13, 1865. Resigned March 15, 1866. Went into firearms business. Died at Hartford, Conn., March 8.

Franklin, William Suddards, American physicist; b. Oct. 27, 1863, at Geary City, Kan.; son of Thos. Henry F. Graduated, University of Kansas, 1887; then studied in Germany and at Harvard. Assistant Professor of Physics University of Kansas, 1887. Professor of Physics and electrical engineering, Iowa State College, 1892-7. Same at Lehigh University, 1897-1903; Professor

of Physics, 1903-15. Now Professor of Physics, Mass. Institute of Technology. Has written treatises on electric lighting and physics, and also collaborated in similar works.

Franklin and Marshall College, a college in Lancaster, Penn., U.S.A., organised in 1787, under care of Reformed Church, U.S.A. It has 38 instructors, 625 students, and a library of 30,000 volumes.

Franklin Institute, founded in 1824, and located in Philadelphia, Pa., U.S.A., is the oldest school in the U.S.A. for the study of the mechanical arts and applied sciences. It owns the finest technical library in the country. Its medals and certificates of awards to those who have done most to advance the physical sciences in their application to inventions are highly prized.

Frank-marriage, a species of estate tail in old Eng. law whereby a freeholder granted land to his daughter or cousin or near blood relation on her marriage, to be held by her and her husband and the heirs begotten of their two bodies, free from all manner of service, except fealty to the donor or his heirs.

Frank-pledge. From the earliest times in England there was a custom whereby a man's relations were responsible for his behaviour; out of this grew the principle of forming institutions for mutual security. A number of men formed an association in which they were answerable each for the others; if one committed a crime, the others were liable for his appearance to make reparation, and if he disappeared, themselves had to pay the penalty unless they could prove their innocence. These societies were called *frithborhs*, or peaceborhs, and the Normans translated the Anglo-Saxon word by frank-pledge.

Franks, **The**, the name given to a confederation of Germanic tribes who inhabited the lower and middle Rhine valley during the third century A.D. The tribe may be divided into two main groups, the Salian F. who dwelt on the lower Rhine, and the Riparian F. on the middle Rhine. The chief tribes were the Attuarii, Salii, Sigambri, Chatti, and Bructerii. Towards the end of the third century they began to move W. About 350 the F. were defeated by the Emperor Julian and became a dependency of Rome, but when Clovis (481-511) became their king, the Rom. yoke was thrown off. Clovis defeated the Alemanni round the R. Seine in 495, and by 501 obtained an ascendancy over the Riparian F., thus considerably extending his empire and forming the nucleus of the kingdom of France. During his rule, also, the

F. adopted Christianity, but remained subject to their Salic law. They obtained military supremacy in N. Gaul and founded the first dynasty of Fr. kings. By 597 they were divided into the Austrasian and Neustrian F., who continually struggled for ascendancy over each other, the Merovingian dynasty being finally superseded (752) by the Carolingian. The F. were a democratic tribe. There were only two social grades, the free F. and the captive slaves taken in the fight. At the head was a king, who, with the help of his counts, saw to the execution of the laws drawn up by the great council. They were a martial race, but in time of peace tilled the soil. Consult L. Sergeant, *The Franks*, 1898.

are much resorted to by ladies suffering from nervous disorders. Pop. 3000.

Franz Josef, see FRANCIS JOSEPH.

Franz Josef Land, an archipelago in the Arctic Ocean, situated about 250 m. to the E. of Spitzbergen. It is described as a lofty glacier-covered land reaching an elevation of 2400 ft., and is comprised of some sixty islands which are volcanic. It was discovered by Payer and Weyprecht in 1873, and was explored by Leigh Smith in 1881 and 1882. In 1894 Alfred Harnsworth (later Lord Northcliffe) fitted out an expedition under the leadership of F. G. Jackson. The party landed near Cape Flora, and spent the summer of 1895 exploring the coast to the N.W. They reached Cape Richthofen in 1896, and named



THE RIVER FRASER WINDING ITS WAY BETWEEN CLIFFS OF SANDSTONE

Franzen, Frans Michael (1772-1847) Swedish author, b. in Ulcåborg, Finland. He studied at the University of Abo, where he graduated in 1789. In 1795 he went on a tour through Denmark, Germany, France, and England, but returned in 1796, and was made librarian at the University of Abo. In 1798 he was Professor of Literature, in 1801 Professor of History, and in 1808 was elected a member of the Swedish Academy. On the cession of Finland to Russia he went to Sweden, and became in 1831 Bishop of Hernösand. He was a writer of both poetry and prose, but his shorter poems are perhaps his best work, being very beautiful in their simplicity; his songs, too, were very popular, one of them winning the prize in the Swedish Academy in 1797.

Franzensbad, a tn. and watering-place of Bohemia, Austria, 152 m. from Prague. It is situated between the spurs of the Fichtelgebirge, the Böhmerwald and the Erzgebirge, and possesses mineral springs which

the expanse of water to the N. Queen Victoria Sea. In June of the same year they met Nansen on his southward journey, and lent him the *Windward* for his homeward voyage. In 1897 Captain Robertson of Dundee made discoveries in Franz Josef Land, and Wyche's Land was circumnavigated by Pike and Crossley. In 1898 an expedition under Wellman landed at Cape Tegetthof and defined the E. extension of the archipelago. In 1899 the Duke of Abruzzi made his way to Crown Prince Rudolf Land and wintered in Teplitz; the party reached 86° 33' N. lat., 240 m. from the Pole. In 1903 the Zeigler expedition went N. by this route.

Frascati, a tn. of Italy in Rome, situated on the Alban Hills, nearly 1000 ft. above sea-level, and 15 m. S.E. of the city of Rome. It is a popular summer resort, and there are numerous beautiful villas, among which may be mentioned Aldobrandini, Torlonia, etc. It is noted for its market gardens and its wine

trade. F. is built on the site of the ant. Tusculum. Pop. 11,000.

Fraser, a chief riv. of British Columbia, the main branch (S. Fork) rising N. of Mt. Brown in the Rocky Mts., flowing 190 m. N.W., and joining the N. Fork from Lakes Stuart and F. at Fort George. The riv. flows S.W., then S. 370 m. to Hope through the centre of the colony, and finally W., almost parallel with Columbia R., into the Gulf of Georgia between Vancouver and the mainland. Below Cow-Dung Lake the riv. is increased by a tributary from the N.: flows through Moose Lake to Tête Jaune's Cache, the limit of canoe navigation on the riv. Quesnelle and Chilcotin (Chilcoaten) R. are tributaries on the right, but the most important is R. Thompson, flowing from E. to Lytton. There are rich gold deposits (discovered about 1856) in the mountainous districts round the Quesnelle, near Thompson R. and Lake Shushwap. The riv. is navigable for steamers as far as Yale (190 m.). Small steamers are used with very powerful engines, as the current is swift. Large ships can get to New Westminster near the riv.'s mouth. The total length is about 750 m. The canyon, or gorge, of Fraser R. is between Lytton and Yale and noted for its wild, magnificent scenery. On the sides of the canyon the lines of the Canadian Pacific Railway have been laid with difficulty from Lytton downwards. The riv. is called after S. Fraser, who explored it in 1808. Its salmon canneries are important.

Fraser, Simon, Lord Lovat, *see* LOVAT.

Fraserburgh: (1) A seaport tn. in Aberdeenshire, situated on the S. side of Kinnaird's Head, and W. of Fraserburgh Bay. It is noted for its herring fishery, and has considerable export and import trade. It has a good harbour. Originally called Faithlie, the name was afterwards changed to F. in honour of its founder Fraser of Philorth. Pop. 10,500. (2) A tn., Cape of Good Hope, S. Africa, is the cap. of a dist. of the same name. Pop. of dist. 6500, of town 700.

Fraser Island, or **Great Sandy Is.**, off the S. coast of Queensland, stretching from Wide Bay to Hervey Bay. There is excellent fishing.

Fraserville, or **Rivière du Loup en Bas**, a watering place in Temiscouata co., Quebec, Canada, is near the junction of the Rivière du Loup with the St. Lawrence. The principal industries are leather manufs. and tanning, and there are cotton mills. The Fraser Institute is situated here. Pop. 7800.

Fraternities, societies of students in

nearly all the colleges of the U.S.A., with the object of promoting social intercourse, good scholarship, and athletic ability. There is little secrecy in their organisation beyond measures taken to protect their constitutions and mottoes. They are spoken of as Gk. Letter F., as Gk. letters are used to name each F. Each F. has a distinguishing badge bearing symbols and monograms. F. are divided into chapters, one (but not more) of which is in each college. The first society, the Phi Beta Kappa, was organised at William and Mary College, 1776. There are over 40 men's general F. with a total membership of more than 2½ millions: 20 women's general F. with a total membership of 50,000. There are also medical, legal and honorary F. *See* Baird, *American College Fraternities* (1898).

Fratricelli, or **Freréts** (the Little Brethren), the name of certain misguided religious sectaries of the fourteenth century. Claiming to be the true followers of Francis of Assisi they refused to submit to the authority of the church and formed a separate organisation, professing poverty, and having no settled abode. They were suppressed spasmodically by church and civil authorities in the fifteenth century, at times the death penalty being inflicted on their leaders.

Fraud, a legal term of such wide meaning that it may be said to be implied in every civilly or criminally wrongful act, whereby one person is prejudiced by the deception of another. To sustain an action of deceit or F., the person aggrieved must prove: (1) The statement was untrue in fact, and made apparently or in reality with the intent that he should act upon it; (2) the person who made it either knew of its falsity or was recklessly and consciously ignorant whether it was true or not; and (3) he (plaintiff) acted upon it and, in consequence, suffered damage. It is not essential to an action of F. that express words should have been used by the defendant, if by his conduct, suggestions, or active concealment of something material, he causes the plaintiff to be misled. But a *suppressio veri* (suppression of truth) is only regarded as tantamount to F. where the withholding of that which is not makes that which is stated absolutely false. Merely allowing a man to continue to act on an erroneous assumption is not defrauding him if the other person in no way contributed to such error. Generally speaking, however, F. implies a misrepresentation of existing fact. A principal is liable for the F.

of his agent where committed in the cause of the principal's business and ostensibly for his benefit; a husband is liable for his wife's F., and a partner for that of his co-partner. A contract induced by F. is voidable at the option of the defrauded party, for *fraus vitiat omnia* (F. vitiates everything), and, besides rescinding the contract, he is also entitled to damages, but he may, if he choose, leave the contract subsisting and at the same time sue for any damage he has suffered. In accordance with the above maxim, it has long been settled that F. in all courts and at all stages of any particular transaction, if proved, at once vitiates the transaction.

Formerly, false statements made negligently but without active deceit, or false statements made on insufficient grounds, were held to amount to what was called 'legal F.' But the rule now is that no false statement made with an honest belief in its truth can render the maker liable for F. In consequence of this ruling (which is to be found in the classic case of *Derry v. Peek*), the Director's Liability Act, 1890, makes directors and promoters of a company liable in damages for innocent misstatements in a company prospectus, inviting the public to subscribe to shares where such statements were made without reasonable grounds for believing in their truth.

In the criminal law many offences necessarily imply F. (as to civil remedies for crimes see under CRIMINAL LAW), e.g. obtaining by false pretences, embezzlements (q.v.), and all unlawful appropriations by all manner of agents, trustees, and others entrusted with property. In a charge of falsifying accounts, it is not necessary to show that any particular person was intended to be defrauded. As to rendering void fraudulent conveyance by a bankrupt as against his creditors, see under CONSIDERATION.

Frauds, Statute of, 1677. The object of this Act was the prevention of fraud, but it is a legal aphorism that it promotes fraud more often than it prevents it. The statute renders certain classes of contracts unenforceable unless evidenced by writing (as to the five classes, see under CONTRACTS). Unless contracts of the classes in question are so evidenced they can only be enforced (where the circumstances allow) by the aid of the equitable doctrine of 'part performance.' That doctrine applies where one party to a contract, generally for the sale or purchase of land, including house property, seeks to compel the other party to fulfil his

promise to buy or sell and has himself done something in fulfilment (part performance) of his side of the contract in the confidence that the other party would adhere to his promises. Equity in such a case looks upon such acts of part performance, if it is clear that they could only be referable to the contract relied upon, as evidence of the formation of such a contract in spite of the absence of writing. A case frequently cited as an illustration of the kind of acts of alleged part performance that would not be so exclusively referable is that of *Maddison v. Alderson*, where the plaintiff, a housekeeper, who had remained for long in the service of a certain gentleman, sought to make his estate liable after his death for an alleged gift of land to her in consideration of her remaining in his service. It was held that her service was not exclusively and unequivocally referable to the promised gift, and therefore not sufficient evidence of a promise in the absence of writing.

Frauenfeld, the cap. of the Swiss canton Thurgau, situated on the Murg. It has a tenth-century castle. The manufactures are cottons, silks, woollens, and iron goods. Pop. 8000.

Frauenlob, see HEINRICH VON MEISSEN.

Fraunce, Abraham (c. 1560-1634), Eng. poet, the dates of whose birth and death are uncertain. He was educated at Cambridge, at the expense of Sir Philip Sidney, and, after studying law at Gray's Inn, was called to the Welsh Bar. But he is chiefly remembered for his *Lamentations of Amintas for the Death of Phillis*, and other writings, the chief of which are *The Countess of Pembroke's Ivy Church* and *Emanuel* and a translation of the *Ethiopics* of Heliodorus.

Fraunhofer, Joseph von (1787-1826), a Ger. optician, b. at Straubing in Bavaria. His father was a glazier, and he was apprenticed to a glass polisher, but he accidentally came into the possession of a sum of money which permitted him to start in business for himself. In his leisure he pursued scientific investigations in mathematics and optics. By the help of Utzschneider he obtained the position of optician to the mathematical institute at Munich, and succeeded in making achromatic glass for telescopes of such excellence that his fame spread all over Europe. The great telescope at Dorpat was made by him; he also discovered the dark lines in the sun's spectrum, which take his name.

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Conservator of Cabinet of Natural Curiosities at Munich.

Fraustadt, a tn. of Prussia in the prov. of Posen, about 14 m. N.E. of Glogau. Here, in 1706, Charles XII. of Sweden gained a victory over the Saxons. Tanneries, sugar factories, and dye works are situated in this town. Pop. 7800.

Fraxinus, see **ASH**.

Fray Bentos, or **Independencia**, a tn. of Uruguay, and cap. of Rio Negro. It is on the Uruguay R., about 170 m. N.W. of Montevideo. The tn. is engaged in the manuf. of extract of meat. Pop. about 5000.

Frazer Island, or **Great Sandy Island**, see **FRASER ISLAND**.

Frazer, **Sir James George** (b. 1854), Scottish author, b. at Glasgow. He is a fellow of Trinity College, Cambridge, and in 1907 was appointed professor of social anthropology in Liverpool. His works are mostly on mythology; the chief one being *The Golden Bough*, 12 vols., 1890-1915, which deals with comparative religion. His other works are: *Totemism*, 1887; *Pausanias and other Greek Sketches*, 1900; *Lectures on the Early History of the Kingship*, 1905; *Questions on the Customs, Beliefs, and Languages of Savages*, 1907; *Psyche's Task*, 1909; *Totemism and Exogamy*, 1910; *Letters of William Cowper*, chosen and edited with a memoir and a few notes by J. E. Drayer, 1912; *The Belief in Immortality*, etc., 1913; *Essays of Addison*, edited, 1915; *Folk-lore in the Old Testament*, 1918; *The Worship of Nature*, i., 1926; *The Fasti of Ovid*, 5 vols., 1929; *Myths of the Origin of Fire*, 1930. Knighted 1914; received the Order of Merit, 1925.

Frechen, a vil. of the Rhine prov., Prussia, in the gov. of Cologne, 22 m. S.S.W. of Düsseldorf. Earthenware is manufactured here. Pop. 8000.

Fréchette, **Louis Honoré** (1839-1908), a Fr. Canadian poet, b. at Lévis, Quebec. He was called to the Canadian Bar (1864), but entered upon a journalistic career in Chicago. In 1874 he was elected to the Dominion parliament, but was defeated at the election of 1878. He edited *La Patrie*, made several translations from the Fr. and wrote *Mes Loisirs*, 1863; *La Voix d'un exilé*, 1867; *Les oiseaux de neige*, 1880; and the two historical dramas, *Papineau*, 1880, and *Félix Pontre*, 1880. He was elected president of the Royal Society of Canada.

Fredegond, **Fredegunde**, or **Fredegunda** (c. 545-97), a Frankish queen, first mistress and then wife of Chilperic, King of Neustria. She parted Chilperic from his first wife, An-

dovere, whose servant she had been, but he then married Galsvintha. F. was suspected of murdering her in the same year (567), and became her successor. This caused war between Chilperic and his brother Sigibert of Austrasia, whose wife, Brunhilda, was sister to Galsvintha. F. had Sigibert assassinated at Vitry (575), and made away with all who stood in the way of the succession to the throne of her own son Clotaire II. After the murder of Chilperic in 584, she carried on war against Brunhilda and her descendants, but failed to kill the queen, and died during the campaign.

Fredericia, a seaport of Denmark, on the S.E. coast of Jutland, at the N. entrance of the Little Belt. It manufs. tobacco, chicory, hats, and cotton goods; is the junction of the Jutland railways, and has considerable shipping trade. The principal exports are meat, fish and eggs; imports, pottery, salt and petroleum. It has had an exciting history. The fortress was stormed by Swedes in 1657, and two years later was dismantled and occupied. It again stood siege in 1709-10, and was captured by the Prussians in 1848, and in 1864 was evacuated by the Danes after a six weeks' siege. Pop. 18,000.

Frederick, the co. seat of F. co., Maryland, U.S.A., 41 m. W. by N. of Baltimore. It has a Jesuit institution and a college. The manufs. include canning, brush-making, tanning, and flour-milling. Pop. 14,434.

Frederick I. (1123-90), Emperor of Holy Roman Empire 1152-90, surnamed Barbarossa or Redbeard. He was the son of Frederick II. of Hohenstaufen, Duke of Swabia, and succeeded his father as Duke of Swabia in 1147, and his uncle Conrad III. as King of Germany in 1152. He reduced Ger. to order during the early years of his reign, and then proceeded to establish the imperial authority in Italy. At Pavia he received the Lombard crown, and in 1155 was crowned emperor in Rome by Adrian IV. Four years later began the long contest between F. Barbarossa and Pope Alexander III., Adrian's successor. Various struggles and treaties ensued; but at last, in 1177, F. made his peace with the Pope, and was enabled to turn his attention to Germany, where he had to contend with Henry the Lion, Duke of Bavaria and Saxony, head of the house of Guelf. He, however, succeeded by his energetic measures in crushing the Guelf power in Ger., and in 1189, having settled the affairs of the empire and established universal peace in his

dominions, he resigned the gov. to his eldest son, Henry, and put himself at the head of the Third Crusade. He won two great victories over the Moslems, but was drowned in a small stream in Cilicia in 1190. On the whole the reign of F. was a happy and prosperous time for Ger. He encouraged the growth of towns and took strong and successful measures to establish order. He is said to have taken Charlemagne as his model. His memory in Ger. is cherished as that of the best and greatest of his race. See Prutz, *Kaiser Frederick I.* (3 vols.), 1871-73; Fischer, *Kreuzzug Friedrichs I.*; N. von Bünan, *Leben und Thaten Friedrichs I.*; V. Chevalier, *Répertoire des sources historiques du moyen âge*, 1904, etc.

Frederick II. (1194-1250), a Rom. emperor, son of the Emperor Henry VI. and Constance, heiress of Sicily, and grandson of the Emperor Frederick I., thus a member of the Hohenstaufen family, b. near Ancona in Italy. On his father's death he was crowned King of Sicily at Palermo (1198), and on the death of his mother in the same year, Pope Innocent III. became his guardian and regent of Sicily. He was elected Emperor of Ger. in 1212 on the excommunication of Otto IV., and his coronation took place in 1215 at Aix-la-Chapelle. Three years later, on the death of Otto, F. became undisputed ruler of Ger., and adherents gathered around him. In 1228 he entered on a Crusade, and set sail for Palestine, and by a treaty made in 1229 he secured the possession of Jerusalem, Bethlehem, Nazareth, and the surrounding neighbourhood, being crowned king of Jerusalem. During his absence the new pope, Gregory IX., had devastated his possessions in Italy, but his efforts failed to arouse serious opposition in Sicily and Ger., and F., on his return, had no difficulty in driving back his enemies, and a peace was patched up between Pope and Emperor at San Germano. In the ensuing struggle, however, F. neglected his duties in Germany, and, aided by the Lombard cities and many Ger. nobles, the papacy at length won the day. F. was famed for his wide knowledge and learning, and his chief claim to fame is as a lawgiver. He was tolerant in religious matters, and the reforms he instituted showed him to be in advance of his time. His ideas of gov. were those of an absolute monarch, and although his rule in Ger. and Italy was a failure, he was more successful in Sicily. See Blondel, *Etude sur la Politique de l'Empereur Frédéric II. en Allemagne*; *Die letzten Hohen-*

staufen (Göttingen), 1871; Polz, *Friedrich II. und Papst Innocenz IV.*, etc., etc.

Frederick III. (1415-93). A Rom. emperor, b. at Innsbruck in the Tyrol, son of Ernest of Hapsburg, Duke of Styria and Carinthia. In 1440 he was chosen Ger. king at Frankfort under the title of Frederick IV., and in 1463 he united Upper and Lower Austria under his rule, taking the title of Frederick V., Archduke of Austria. His reign covered a difficult period—Hungary and Italy were invaded by the Turks, and Vienna was occupied by the Hungarians. He, however, managed to dupe Charles the Bold, who wished to secure the royal title, and gradually reunited the family territories of the Hapsburgs, the marriage of his son Maximilian with Mary, daughter and heiress of Charles the Bold, Duke of Burgundy, rendering the Hapsburg family one of the greatest dynasties in Europe. F. was a listless and incapable ruler, though he had many excellent personal qualities, and had a great belief in the future greatness of his family. He was of a studious disposition and had a real love of learning, and towards the end of his reign handed over the gov. of his lands to his son Maximilian, retiring to Litz, where he passed his time in study. See A. Huber, *Geschichte Österreichs*, and J. Chmcl, *Geschichte Kaiser Friedrichs IV. und seines Sohnes Maximilians I.*

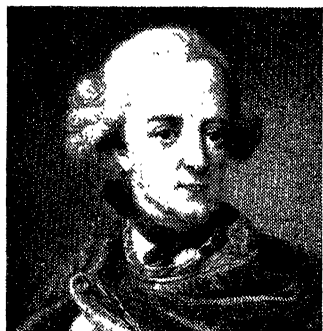
Frederick I. (1423-28), Elector and Duke of Saxony, surnamed 'the Pugnacious,' b. in 1369, son of Frederick the Stern of Meissen. On his father's death (1381), F. was involved in disputes with his two brothers and two uncles, the inheritance being divided between them. He won distinction as a soldier, and as a reward for his successes against the Hussites the Emperor Sigismund made him Duke of Saxony, 1423. The Hussites crushed him, however, at Aussig three years later (1426). In 1409 he founded Leipzig University. See Life by Spalatin, in *Scriptores rerum Germanicarum, præcipue Saxoniarum*, ii. (Mencke's edition), 1728-30; Böttiger and Flathe, *Geschichte des Kurstaates und Königreichs Sachsen*, 1867-73.

Frederick III. (1463-1525), surnamed 'the Wise,' Elector and Duke of Saxony, succeeded his father, Ernest, in 1486. He exercised an enormous influence on Ger. politics of the sixteenth century. He founded the University of Wittenberg (1502), and called Luther and Melancthon to chairs in the faculty. He granted toleration to the creed of the Reformers, but did not adopt it

himself. On the death of Maximilian I. he refused the offer of the imperial crown (1519), warmly supporting Charles V. (then Charles I. of Spain.) F. was succeeded by his brother John. See Kolde, *Friedrich der Weise und die Aufzüge der Reformation*, 1881; Mencke, *Dissertatio de Friderico III. Sapiente*, 1712, and Ekerman, 1761; Melanchthon, *Oratio de Friderico duce Saxonie*, 1551.

Frederick I. (1701-13), first King of Prussia, Elector of Brandenburg as Frederick III. (1688-1701). He was the son of Frederick William, the Great Elector of Brandenburg, and born 1657. His name has become proverbial for vanity and extravagance, but he was loved by his subjects, and a patron of such men as Spener, Francke, Thomasius, and Leibnitz. He founded the University of Halle (1694) and the Academy of Sciences, and was also founder of the Order of the Black Eagle. F. supported the League of Augsburg against Louis XIV., and helped William III. in the revolution of 1688 in England. The Emperor Leopold of Austria granted him the royal title on the eve of the War of the Spanish Succession in return for his support. In 1707 he was elected Prince of Neuchâtel. See Tuttle, *History of Prussia*, 1884-88; Henderson, *Short Hist. of Germany*, 1902; Ledebur, *König Friedrich I. von Preussen*, 1878-84; Pierson, *Preussische Geschichte*, 1898.

Frederick II. (1712-86), a son of Frederick William I. of Prussia and Sophia Dorothea, daughter of George I. of England. He was king of Prussia



FREDERICK THE GREAT

1740-86, and was known as 'The Great.' His great wars occurred during the first half of his reign. On the death of the Emperor Charles VI., he

invaded Silesia, and in the first campaign gained the victory of Mollwitz. He then allied himself with France, and after the victory of Chotusitz, the Peace of Breslau (1742) was concluded, by which Austria ceded most of Silesia to Prussia. Two years later he re-opened the struggle, and succeeded in effecting the Treaty of Dresden, a repetition of the Treaty of Breslau. In 1756 the Hapsburgs formed an alliance against Prussia with France, Russia, Saxony, and Sweden—England, as the enemy of France, siding with F. Then began the great Seven Years' War, the outcome of which was the culmination of F.'s military career, but which taxed the kingdom to its utmost. By wise financial measures, however, F. soon placed Prussia on a sound basis, and was enabled to improve its agricultural and industrial condition. F. looked upon his power rather as a trust than as a source of personal advantage; this he faithfully discharged according to his lights. Throughout his reign he took the greatest interest in the improvement of the Prussian army. See Tuttle, *History of Prussia under Frederick the Great*; Longman, *Frederick the Great and the Seven Years' War*; Lavisse, *Le jeunesse des grand Frédéric*; Kugler, *Geschichte Friedrichs der Grossen*, etc.

Frederick III. (1831-88), second German Emperor and King of Prussia (March-June 1888), son of William I. of Prussia (first emperor of united Germany), and known as Frederick William before his accession. He studied at Bonn University, and travelled widely. He married Victoria, Princess Royal of England, in 1858, and became Crown Prince of Prussia on his father's accession, 1861. F. fought in the war with Denmark, 1864; in that with Austria, 1866, being present at the Battle of Sadowa. In the Franco-German War he fought successfully at Weissenburg, Wörth, and later at Sedan. He took part also in the siege of Paris. F. greatly influenced the founding of the new Ger. Empire, though his plans often differed from Bismarck's. He wrote diaries of his travels, and of the wars of 1866 and 1870-1, and was popularly called by the army 'Unser Fritz.' During his father's illness in 1878 he became provisional regent. His eldest child is the ex-Emperor William II. See Life by Rood, 1888; by Freytag, 1890.

Frederick V. (1610-23), Elector Palatine, son of Frederick IV., was b. in 1596, and d. in exile, 1632. He married Elizabeth, daughter of James I. of England, 1613, and was grandfather of George I. In 1619 F. headed the Ger. Protestant Union

(Calvinists), and accepted the crown of Bohemia. F.'s general was utterly defeated by the Imperialists at the Battle on the White Hill (near Prague), 1620, and he lost his hereditary possessions as well as Bohemia, and was obliged to go into exile. The electoral dignity was conferred on Maximilian of Bavaria, his cousin, the Catholic leader, 1623. F. was father of Prince Rupert. See Ersch und Gruber, *Allgemeine Encyclopædie*; Lipowski, *Friedrich V., Curfürst von der Pfalz und König von Böhmen*; Gindely, *Geschichte des dreissigjährigen Krieges*, 1869-80.

Frederick I. (c. 1471-1533), King of Denmark and Norway 1523-33. He succeeded his nephew Christian II., who was dethroned, and the long war entered into for the possession of Norway ended in his favour. He was joint ruler of the duchies of Schleswig and Holstein, with his brother John. He was an able ruler and granted many privileges to the nobility. During his reign, the Lutheran faith spread in his dominions.

Frederick II. (1534-88), son of Christian III., and King of Denmark and Norway. His reign falls into two distinct periods—that of war, 1559-70; that of peace, 1570-88. The war with Sweden lasted seven years, ending in the triumph of F. at the Peace of Stettin. F. possessed the gift of discovering and employing great men, and no other Danish king was ever so beloved by his people. See R. N. Bain, *Scandinavia*, 1905.

Frederick III. (1648-70), King of Denmark and Norway, son of Christian IV., b. 1609, becoming Bishop of Verden, 1623, Archbishop of Bremen, 1643. Hoping to regain territory lost by the Treaty of Brömsebro, 1645, F. and his senate declared war on Charles Gustavus of Sweden, 1657. But Charles invaded Jutland and besieged Copenhagen, forcing the Danish people to sign the unfavourable Treaty of Roeskilde, 1658. Hostilities were soon resumed, but F., aided by Brandenburg, expelled the Swedes from Jutland, forcing Charles to raise the siege of Copenhagen, 1659. A peace favourable to Sweden was concluded, 1660. The monarchy was made hereditary and absolute instead of elective and limited by a voluntary act of commons and clergy at a Diet, 1660-61. See Nyerup, *Efterretninger om Kong Frederik III.*, 1817; Becker, *Samlinger til Danmarks Historie under Frederik III.*, 1847.

Frederick IV. (1699-1730), King of Denmark, son of Christian V., was b. in 1671. He allied with Peter the Great and Augustus II., King of Poland, in 1700, against Charles XII.

of Sweden, but was forced to sign the Peace of Travendal on the latter's siege of Copenhagen. During the reverses of Charles in 1709, F. again made war, capturing Stralsund and Tönningen. Charles was killed at the siege of Frederickshall in Norway, 1718. In 1720 F. concluded the Treaty of Frederiksborg with Sweden. He died, regretted by his subjects, and was succeeded by his son, Christian VI. See Riegel's *Udkast til Fjerde Frederiks Historie*, 1799; Hoier, *König Friedrich's IV. glöwürdigstes Leben*, 1829.

Frederick V. (1746-66), King of Denmark, b. in 1723; he succeeded his father, Christian VI., in 1746, and married the daughter of George II. of England. A wise and able ruler, he did much to promote commerce, industry, and science. The emancipation of serfs was secured in some districts, and a hospital and academy of fine arts were founded at Copenhagen. The Asiatic Company was established, and American colonial trade opened. F. sent Niebuhr and others on a scientific expedition to Egypt and Arabia, 1761. See Baden, *Fredriks Regjerings Aarbog*, 1832; Arentz, *Ligprædiken over Kong Frederik V.*, 1767.

Frederick VI. (1808-39), King of Denmark and Norway, son of Christian VII., was b. in 1768, and assumed the regency in 1784, owing to his father's insanity. His rule was marked by many reforms, including the abolition of serfdom in Denmark and Schleswig-Holstein. F.'s chief minister was Bernstorff. In 1800 Denmark joined the armed neutrality of the N. against England. This caused hostilities with the British, and F. allied with Napoleon, 1808. In 1814 Norway was taken by the allies from Denmark and given to Sweden under Bernadotte. See Giessing, *Zur Regierungsgeschichte Friedrichs VI.*, 1851-52; Bang, *Mindetale over Kong Frederik VI.*, 1840.

Frederick VII. (1808-63), King of Denmark, son of Christian VIII., whom he succeeded in 1848. The chief events of his reign were the wars arising out of the revolt of the Schleswig-Holstein duchies, with whom he dealt tyrannously, and the dispute over the succession to Denmark proper and the duchies, both the king and his uncle, the heir-presumptive dying without issue. F. also restored parliamentary government in Denmark.

Frederick VIII., King of Denmark, son of Christian IX., succeeded his father in 1906. He married Princess Louisa of Sweden in 1869, and his eldest son, Prince Christian, was b. in 1870. His second son, Charles, be-

came King of Norway in 1905, under the title of Haakon VII. His consort is Queen Maud, daughter of Edward VII. of England and Queen Alexandra, and they have one son, Prince Olaf.

Frederick (1676-1751), King of Sweden, third son of the Landgrave Karl of Hesse-Cassel. He entered the English military service, and in the War of the Spanish Succession commanded the Hessian corps. In 1715 he entered the Swedish service, and on the resignation of her claims to the throne of Sweden of his wife, Ulrica Leonora, sister of Charles XII., he became king.

Frederick Augustus I. (1750-1827), King of Saxony, son of the elector Frederick Christian, *b.* at Dresden. He succeeded his father under the guardianship of Prince Xavier, his uncle, in 1763, and five years later was declared of age. The reduction of taxes and imports and of the army was one of his chief aims. In the short Bavarian succession war he sided with Frederick the Great against Austria, and afterwards joined the League of German Princes. In 1806 he joined Prussia against France, but concluded a treaty of alliance with Napoleon after the Battle of Jena, and during the subsequent wars of Napoleon, he was a faithful ally of the emperor. The reign of F. A. was characterised throughout by justice and moderation. *See* A. Bonnefous, *Un Allié de Napoléon, Frédéric Auguste, premier roi de Saxe*, 1902.

Frederick Charles of Prussia (1828-85), nephew of the Emperor William I., known as the 'Red Prince.' He was educated at Bonn, and then entered the army, serving with distinction in the first Schleswig-Holstein War in 1848. He also took part in the Austrian War of 1866, and the Franco-German War (1870-71), where his leadership was conspicuous. He gained distinction at the Battles of Gravelotte, Thionville, and St. Privat. He became inspector of the Prussian cavalry after the war.

Frederick Louis, Prince of Wales (1707-51), the eldest son of George II. and Queen Caroline. In 1736 he married Augusta, daughter of Frederick, Duke of Saxe-Gotha, and had several children, the eldest afterwards becoming George III. Frederick, who led a very gay life, was always on bad terms with his father, and, forbidden the court, became the patron of the opposition which made Leicester House its headquarters.

Frederick William (1620-88), Elector of Brandenburg, known as the 'Great Elector,' and son of the Elector George William, *b.* in Berlin. On his father's death in 1640, he became ruler of Brandenburg and Prussia,

and immediately set himself to repair the damage wrought during the Thirty Years' War, still in progress. He first regulated the finances and concluded a treaty of neutrality with Sweden. In 1648, by the Treaty of Westphalia, the area of his dominions was largely increased, and in the course of ten years, with the help of his able generals, he had created an army of 25,000 men, organised on the Swedish model. F. W. played an important part in European politics, and was generally loyal to the interests of the empire and the Hapsburgs, though twice he was on the side of France. He reorganised the universities of Frankfurt and Königsberg, and founded the University of Duisburg and the Royal Library at Berlin. He made the canal which still bears his name between the Oder and the Spree, and introduced numerous industries among his subjects, and a trading company. He greatly enlarged and beautified Berlin, leaving a large exchequer and a thoroughly well-organised army. The services of the Great Elector to Brandenburg and Prussia cannot be overestimated. *See* Tuttle, *History of Prussia, 1134-1740*; Thos. Carlyle, *History of Frederick the Great*; and A. Waddington, *Le Grand Electeur et Louis XIV.*

Frederick William (1711-1815), Duke of Brunswick. In 1788 he first entered the Prussian army and was engaged in active service during the war with France, which began in 1792. He was taken prisoner at Lübeck after the Battle of Auerstadt. Napoleon put up a veto on his accession to the dukedom at the death of his eldest brother, and in 1809 he joined Austria in the war against the emperor. At the defeat of the Austrians at Wagram, he came to England, where he received an enthusiastic reception, and afterwards took part in the Peninsular War till his return, in 1813, to his dominions. After the return of Napoleon from Elba, F. W. joined the allies and fell at Quatre-Bras, June 16, 1815.

Frederick William I. (1713-40), King of Prussia, son of Frederick I. (*d.* 1713), and father of Frederick the Great, was *b.* in 1688. He was passionately fond of military exercises, and noted for his eccentricities. Though he formed a large, well-disciplined army he did not engage in any very important wars. In 1720 he won from Sweden the district of Pomerania between R. Oder and Peene, including Stettin, Wollin and Usedom Is. He founded a splendid administrative system, established a medical college and various useful institutions in Berlin, and left a powerful and wealthy kingdom to his

son and successor. See Tuttle, *History of Prussia, 1134-1740*, 1884; Morgenstern, *Ueber Friedrich Wilhelm I.*, 1793; Förster, *Geschichte F. Wilhelms I.*, 1835; Mauvillon, *Histoire de Frédéric Guillaume I.*, 1741.

Frederick William II. (1744-97), son of Prince Augustus William of Prussia and nephew of Frederick the Great, whom he succeeded in 1786. He undertook a futile expedition into Holland, shortly after his accession, in support of the Stadt-holders, terminating in 1788 in the Triple Alliance between England, Prussia, and Holland. In 1792, in conjunction with Austria, he entered into a war against the Fr. republic, to uphold the royalty, which lasted till 1795, resulting in the cession to France, by the Treaty of Basle (1795), of the Prussian territories W. of the Rhine. By the partitions of Poland, in which F. W. shared, Prussia received large accessions of territory. During F. W.'s reign, owing to his indolence and lack of political sagacity, Prussia declined. He was devoted to the arts, Beethoven and Mozart enjoying his patronage, but was without mental qualities of a high order. See Stadelmann, *Preussens Könige in ihrer Tätigkeit für die Landeskultur*, vol. iii. 'Friedrich Wilhelm II.' 1885; Paulig, *Friedrich Wilhelm II. sein Privatleben u. seine Regierung*, 1896.

Frederick William III. (1770-1840), son of Frederick William II., b. at Potsdam. He became King of Prussia in 1797, and on his accession entered upon a tour of inspection through his kingdom. The repeated insults of Napoleon roused the nation, and Frederick was obliged to agree to a convention with Russia, having as its object the expulsion of Napoleon from Germany. But in 1806 Frederick was overthrown by Napoleon at Jena and Auerstadt, and on the annihilation of the Prussian army, the Fr. overran the kingdom. The Russian armies then advanced to the aid of Prussia, but were overthrown by Napoleon at Friedland (1807), leaving Prussia at the mercy of the conqueror. The Treaty of Tilsit completed the ruin of Prussia, and during the next few years, she remained almost defaced as a European power. At the beginning of 1813, however, the Gers. rose against France, and F. W. entered into an alliance with Russia and Austria, and the allies overthrew Napoleon at the Battle of Leipzig. At the Congress of Vienna, Prussia regained her lost territory. F. W. did much to advance the material welfare of his realm, and the customs union was established in his reign. See *Deutsche Geschichte im XIXten Jahrhundert*, 1886, and

Treitschke-Petersdorff's *König Friedrich Wilhelm IV.*, 1900.

Frederick William IV. (1840-61). King of Prussia, son of Frederick William III., b. 1795. He began his reign with moderate measures, but was vacillating and infirm of purpose, with a marked tendency to mysticism. There was a revolutionary outbreak in Prussia and Berlin, 1848, caused in part by the Fr. revolutionists' triumph, and Frederick was forced to grant a constitution to his people. In 1849 he declined the offer of the imperial crown by the Ger. National Assembly at Frankfurt. They elected the Archduke John of Austria as lieutenant-general. For a time Frederick supported the people of Schleswig-Holstein against Denmark, but he soon abandoned their cause. His irresolution and neutrality in the Crimean War were severely censured. Owing to symptoms of insanity Frederick resigned the control of his kingdom to his brother William, 1858, and was succeeded by him as William I. in 1861. See Rauke, *Biographie Friedrich Wilhelms IV.*, 1878; Biedermann, *Dreissig Jahre deutscher Geschichte*, 1896; Petersdorff, *König Fr. Wilhelm IV.*, 1900.

Frederick William Charles I. (1805-16), King of Württemberg, son of Frederick Eugène, b. 1754, and succeeded his father as Duke of Württemberg, 1797. He married an Eng. princess, Charlotte Augusta Matilda. He became elector, 1803, and by alliance with Napoleon, 1805, gained lands and the title of king. Frederick joined the Confederation of the Rhine in 1806. His army fought on Napoleon's side in 1809, 1812, and 1813, but joined the allies in Nov. 1813, the Treaty of Fulda leaving him his kingdom on this condition only. The people seized this opportunity of his weakness to re-establish their old constitution, changed by Frederick for absolutism. His death intervened before these troubles were settled.

Fredericksburg, a tn. of Spottsylvania co., Virginia, U.S.A., situated on the Rappahannock R., about 55 m. S.S.W. of Washington. The riv. affords great water power, the tide ascending the riv. as far as F. During the American Civil War a battle was fought here, in which the Union forces under Burnside were defeated by the Confederates (1862). The town manufs. paper, leather, machinery, and has fine wheat mills. Pop. 6819.

Fredericton, the cap. of New Brunswick, Canada, on the St. John R. It was originally called St. Ann's. It has a provincial university, an Anglican cathedral, parliament buildings,

and a military school. It is an important commercial centre, and a busy trade by steamer down the riv. There is an extensive trade in lumber, and canneries, tanneries, and machine shops are among its industries. It is served by the Canadian Pacific and Canada Eastern Rlys. Pop. 8000.



PARLIAMENT BUILDING, FREDERICTON

Frederiksberg, a residential suburb on the W. of Copenhagen, Denmark, with a military college. Pop. 98,000.

Frederiksborg, a Danish royal castle built in 1602-20, situated about 20 m. from Copenhagen, Denmark. It was destroyed by fire in 1859, and, after being restored (1864-71), was utilised as an historical museum.

Frederikshald, a seaport and garri-son tn. of Norway, in Smaalenene co., on the Idde fjord, 35 m. by rail S.E. of Christiania. Charles XII. was killed in the trenches of the fortress in 1718. There is a large export trade in timber, and marble of excellent quality is quarried. Pop. 11,000.

Frederikshavn, a seaport and cap. of Jutland, in the prov. of Hjørring, Denmark, on the Cattegat, 36 m. N.E. of Aalborg. It has an excellent harbour, free from ice throughout the year. It is protected by the citadel, Fladstrand, which formerly gave its name to the town. It has considerable trade in dairy produce. Principal exports are fish, oysters, iron, cotton goods, etc. There is a regular steamship service running to Sweden, Copenhagen and England. Pop. 8000.

Frederikstad, a seaport of Norway, in Smaalenene co., at the mouth of the Glommen, 58 m. by rail S.E. of

Christiania. It exports timber, and manufs. bricks, machinery, cotton, and woollen goods, and has ship-building works. Pop. 14,000.

Fredonia, a vil. of Chautauqua co., New York, U.S.A., 3 m. from Lake Erie. It contains a Normal School, and the Darwin Barker public library. There are grape-vine nurseries, canneries, and patent medicine works. Pop. 5814.

Fredonia, a tn. of Columbia, in dept. Antioquia, S.E. of Medellin, with coal mines. Pop. 11,000.

Freebench, in Eng. law, the interest which a widow has in the copyhold lands of her late husband, so long as she remains unmarried. The amount to which she is entitled amounts in general to one-third of the lands held by her husband.

Free Church of England, a small sect which broke away from the Established Church in 1844, as a protest against the influence of the Tractarian or Oxford Movement. It maintains the episcopal organisation, and is said to have retained the Apostolic Succession. It is, however, strictly Protestant in doctrine, and seeks to promote evangelical and Reformation principles. Its first church was formed at the town of Bridgetown in Devon by the Rev. J. Shore. Its numbers are extremely limited. Government is carried on by an annual convocation.

Free Church of Scotland, United, the body of Scottish Presbyterians who at the 'Disruption' of the Church of Scotland in 1843 separated from the Established Church. It claimed, and still claims, however, to be the historical continuation of the National Church which was set up in 1560. It retains the 'Confession of Faith and the Standards of the Church of Scotland as heretofore understood,' that is to say the Westminster Confession and the Longer and Shorter Catechisms, but in 1892 the binding force of these was somewhat modified by a Declaratory Act, which classed some parts of the Confession among things not to be considered as literally binding. This is quite in accordance with the Free Church Catechism issued soon after the Disruption, in which the right of a church to alter its creeds and formularies without state sanction is reckoned as one of the essentials of its freedom. The Disruption was caused generally by an entire difference of opinion on the whole question of establishment and the authority of the state over the church. The proximate cause, however, was the question as to whether a minister could be forced on an unwilling congregation. It is important, however, to recognise that

the leaders of the Free Church party in 1843 did not condemn all union of church and state, but only such as infringed the church's right of self-government, committed to her by Christ Himself, of Whom the Westminster Confession declares 'the Lord Jesus, as King and Head of His Church, hath therein appointed a gov. in the hand of church officers, distinct from the civil magistrate.' Since the 1688 Revolution, however, the union between church and state had been such that all of these ecclesiastical regulations had been made part of the statute law. A case had arisen in which a minister presented to a living had been rejected by the congregation, and in 1834 the General Assembly passed the Veto Act declaring it to be a fundamental law of the church that no pastor should be intruded on any congregation contrary to their will. In 1838, in the Auchterarder case, the Court of Session, however, decided in favour of the presentee, and in the next year the case came before the House of Lords. Here the civil power showed but scant respect for the church's ecclesiastical jurisdiction, and definitely stated the supremacy of the statute law in all cases, denying in fact that it is even possible that there should be such a thing as a 'conflict' between the civil law and the ecclesiastical courts of an established church. In 1842, the General Assembly formally refused to enter on the course of action which the recognition of this principle would involve, and threatened a separation from the state. In 1843 an attempt was made to secure a parliamentary inquiry, but this failing, at the meeting of the General Assembly (May 18, 1843) the major part of the Assembly made their protest and quitted St. Andrew's church. They proceeded to Tanfield Hall, Canon-mills, and there was held the first Free Church Assembly, with Dr. Thomas Chalmers in the chair. By May 23, 474 ministers had resigned their benefices, homes, and incomes, and trusted themselves entirely to voluntary support. The financial system was organised quickly and most successfully, and a central Sustentation Fund furnished a reasonable income for all ministers. A committee was formed in 1863 to consider the proposal of alliance with the United Presbyterians, but the refusal of the Free Church to give an unqualified condemnation of establishment made it impossible. The proposals, however, were continually renewed, and on Oct. 31, 1900, union between the two was finally completed at Edinburgh, the newly-

formed body bearing the title of the United Free Church. A small body refused to accept this union, and claimed to be the continuation of the old Free Church. It, therefore, claimed the possession of all its emoluments, and the House of Lords decided in favour of the small body. The impossible nature of the decision was immediately apparent, and a division of the property, etc., between the two bodies was made by a Royal Commission. There are now twelve Synods and sixty-three Presbyteries and two Continental Presbyteries. There are about 1440 congregations and the membership is over 536,000. The Supreme Court is the General Assembly, which meets annually, in May, synchronously with the meeting of the General Assembly of the Established Church and of the remanent Free Church of Scotland. Over £300,000 was raised in 1927, in which year the income of the church was £1,543,752.

Free Churches, the general name given to all those Protestant Christian bodies of England and Wales which are not established by the state. They include not only the large group which forms the Free Church Federation, but also many others not thus associated. The point in common between all these bodies is implied in the title. All hold that permanent union between church and state is impossible, since it leads to the state imposing laws on the church, and that, therefore, the two should exist separate, the church being free to make its own rules and carry on its own system of government in matters spiritual. Most of the Free Churches are democratic in form, and the governing body has the power of changing the conditions of membership, deciding on corporate expressions of faith, etc.

Freedom of a City, see **BURGESS** and **FREEMAN**.

Freedom of the Press, see **PRESS**, **FREEDOM OF THE**.

Freehold. A F. estate or interest in land may be strictly defined as an interest which may continue for the period of some particular life or lives, whether limited to the duration of some person's life, or of some uncertain period included in such life, as *e.g.* to continue during widowhood, or until bankruptcy. The term necessarily comprises the larger interest, fee simple and fee tail estates or estates of inheritance, and indeed F.s. are frequently divided into those of inheritance and not of inheritance, the latter being F.s. for life. The term F. (*liberum tenementum*) comes from feudal times, and meant that the tenant held his land by some small

services of an honourable as opposed to a base or servile kind. Such services are now long since abolished, and the only feudal incidents of a F. still surviving, or nominally surviving, are: (1) Escheat or devolution to the Crown on intestacy, there being no heirs; (2) an oath of fealty, never exacted; (3) relief, or a year's rent to the feudal overlord (if there is one) on succession to the deceased tenant; (4) a small chief or quitrent. There are also other Fs. of an extraordinary or more localised kind, viz. Grand Serjeantry (*q.v.*); Petty Serjeantry (*q.v.*), Burgage tenures (*q.v.*), Gavelkind (*q.v.*), and Frankmoeign or tenure by spiritual services, such as saying prayers for the parishioners. The learning in Fs. is for the most part academic, and at the present day it may be said to be mainly regarded as merely the direct antithesis of a leasehold interest, a F. being necessarily an estate for a certain period of uncertain duration, while a leasehold interest is no more than one for a fixed term of years. The third principal form of landholding is that of copyhold tenure, which in its origin was a holding by villeins of a lord of a manor; but which in its later development became largely assimilated to F., and may on certain payments be compulsorily *enfranchised* (i.e. turned into a F.).

Free Imperial Cities. The *Freie Reichs-Städte* of Germany were those mediæval towns which enjoyed either complete or partial autonomy. They may in their constitution be compared to the chartered towns of mediæval England, the free towns of Spain (see *Fuero*), and the Italian republican cities of the same period. In all or most of these cases the anomaly of such an *imperium in imperio* was due to the wealth and influence early acquired by towns through industry and commercial relations and consolidated by defensive leagues like the celebrated confederacy of the Hanseatic League. The number of F. I. C. varied from time to time by reason of the struggle to maintain their privileges in the teeth of ecclesiastical and secular opposition and royal jealousy. Mainz, the head of the Rhine Confederated Towns, became transferred to the episcopal see in the middle of the fifteenth century, while Chemnitz and certain other towns of that league were subsequently taken by the Dukes of Saxony. Others were shorn of their privileges by successive emperors, and yet others were conquered by foreign enemies. At the end of the eighteenth century they numbered about fifty, divided into two benches, the Rhenish and Swabian, as two integral

members of the Diet. At the beginning of the nineteenth century only six possessed any measure of independence, some having been assigned to France while the rest were deprived of privileges of which they had long since ceased to retain anything but the shadow. By the terms of the Ger. confederation only Hamburg, Lübeck, Bremen, and Frankfurt were recognised as F. I. C., but the privileges which the first three still preserve are now of no greater importance than those of various boroughs in England. See *The German Free Cities* (Dent, 1914).

Free-lances, roving companies of knights and men-at-arms, who wandered about to different states selling their services to any lord who was anxious for aid in the constant feuds of the Middle Ages. They became most famous in Italy as '*condottieri*.' In Germany they were represented by the '*Landsknechte*' (land-troopers), mercenary foot-soldiers raised by Maximilian I. in 1487. '*Landsknechte*' were the men of the Austrian lands as opposed to the Swiss mountaineers, but are commonly confused with '*Lanzknechte*' (lance-troopers). They won fame in the fifteenth and sixteenth centuries' wars, but after the Thirty Years' War fell into disrepute. The term is now applied in general to all who own no fixed party allegiance, or follow the methods of no particular school, but act independently (and sometimes capriciously).

Freeland, a tn. of Luzerne co., Pennsylvania, U.S.A., 28 m. S.W. of Scranton. In the vicinity there are coal and anthracite coal mines. The borough has breweries, silk mills, and foundries. Pop. 7098.

Free Libraries, a development of comparatively recent times, though the first was established by Chatham in Manchester, England, 1653. The modern library movement started in 1876 with the foundation of the American Library Association. The name of Carnegie must always be associated with the growth of public libraries. Since 1881 he has contributed enormous sums yearly for their foundation. The tax-supported free public library ('municipal' or 'endowed') is ousting the circulating, subscription, and proprietary libraries. Free access to open shelves is now allowed in many libraries, and not only the reference but also the lending departments are mostly free of charge. See Greenwood, *Free Public Libraries*, 1890; Edwards, *Free Town Libraries*, 1869; Ogilvie, *The Free Library*, 1897; Fletcher, *Public Libraries in America* (2nd ed.), 1899. See **LIBRARIES**.

Free Lovers, see BIBLE COMMUNISTS and PERFECTIONISTS.

Freeman, one who possesses the freedom of a city, borough, or company. Prior to the Municipal Corporations Act, 1835, borough freedom was regulated by the borough charter. An admitted F. enjoyed many rights and privileges which varied in different boroughs. *Inter alia*, a F. generally had the parliamentary vote, immunity from county jurisdiction, exemption from tolls, and a share in the revenue accruing from the corporate property. The Act of 1835 does not affect the rights of their admitted F., and the following are still entitled to be admitted F. and to enjoy the above noted rights except exemption from tolls: borough inhabitants; wife, widow, son, daughter, son-in-law, of a F.; apprentices to F.; and those who before the Act would have been entitled to be admitted, otherwise than by gift and purchase, the two latter modes of admission being now abolished. Borough councils may also admit persons of distinction, or persons who have performed eminent services for the borough to be honorary F. Freedom of a city is tantamount to that of a borough, the distinction between a city and borough being merely ecclesiastical. Freedom of the London livery companies is a survival of the guild-merchant system. There are four ways of acquiring the freedom of a company: (a) apprenticeship to a F. either of the company or of the City of London; (b) patrimony, i.e. by reason of being the child of an admitted F.; (c) gift (honorary), redemption or purchase, usually limited to members of the guild trade.

Freeman, Edward Augustus (1823-92), an historian, educated at Trinity College, Oxford. While at the university he began to devote himself to the study of history and architecture. His first books were: *A History of Architecture* (1849), *Window Tracery in England* (1850), and *History and Antiquities of St. David's, Oxford* (1856). In the last year he published also *The History and Conquests of the Saracens*, his first contribution to history. Some further books followed, and then came *The History of the Norman Conquest* (1867-79), his most outstanding achievement. He wrote many other works, but it is as the historian of the Norman Conquest that he will be best remembered. While lacking the charm and the literary eloquence of Froude, he has the advantage over his contemporary of being thoroughly reliable and of following the authorities upon which he based his conclusions. He was

regius professor of modern history at Oxford from 1884 until his death. There is a biography by Dean Stephen, 1895.

Freemasonry, the system observed by the secret associations of 'free and accepted masons.' Much vainglory yet interesting conjecture has ever surrounded the theories anent the origin of F., and no point of time in antiquity seems too remote for its genesis in the eyes of its more enthusiastic friends. Some trace it to the time of the erection of the Tower of Babel, others to that of Solomon's Temple. A highly ingenious freemason, Mr. Albert Churchward, in a work entitled *Origin and Antiquity of Freemasonry* (1898) has endeavoured, with the aid of numerous cabalistic diagrams of a geometrical character and pictorial representations from a papyrus of Ani of Maat and Osiris seated on a Masonic square, to show the analogy of F. 'to the eschatology of the anc. Egyptians, as witnessed by the *Book of the Dead* and the Great Pyramid of Ghizeh, the first Masonic temple in the world.' The author contends that the information vouchsafed to him has been obtained from existing facts, susceptible of proof by anyone devoting his attention to the subject. He looks upon modern F. as merely a modernisation of the old ritual; but the uninitiated may be inclined to be sceptical from his curious avowal that, having attained to the eighteenth degree only, and not being in possession of the secrets and forms and ceremonies of the thirtieth to the thirty-third degrees, he has no first-hand acquaintance with the secrets of the various degrees after the eighteenth. The result is that, without entering on religious or theological arguments, Churchward attempts to show that many of the forms, words and symbols of F. were used by anc. brethren no less than 10,000 years ago. A Dr. le Plongeon, however, had already attempted to trace the origin of F. back to the sacred mysteries among the Mayas and Quiches 11,500 years ago, from data gathered from excavations in Yucatan in Mexico. More modest computations go no further than to place the introduction of F. into England in the seventh century, and the foundation of the Grand Lodge at York in A.D. 926. Others allege that F. came into existence at the time of the Crusades, but in view of the almost atheistical character attaching to the freedom of Masonic religious conceptions, this seems improbable. But the most unbiased historians seem to concur in relating its origin to the purely utilitarian association of fellow-craftsmen in a masons' guild

or trade union. There is some warrant for this genealogy, because the art of Gothic architecture and its allegorical meaning were in no small degree the possession of the stone-cutters who were employed by the abbots in ecclesiastical buildings and repairs. The secret signs used by itinerant masons were devised for the purpose of mutual recognition of each other as experts in their art and not mere impostors. Moreover, the twelfth century affords something like proof of the existence of an association of Bauhütten (literally 'wooden huts' of masons or stone-cutters) in various parts of Germany, bound together by common craft laws and trade customs, and acknowledging a common ceremonial and set of symbolic forms.

Whatever the origin of F., there is clear enough evidence that modern F. in England dates from the foundation of the Grand Lodge of England in 1717; that of Ireland being founded in 1730, and Scotland in 1736. But what particular processes were at work in the transition of 'operative' to modern or 'speculative' F. it is hard to say. The traditions of F. seem to warrant the assumption that in spite of the fact that mediæval or 'operative' freemasons were usually engaged in erecting or repairing church buildings, they had no marked reverence for the church doctrine, and that though the church was at first disposed to extend its favour to the association, it eventually grew hostile to it and supported the ineffective prohibition of F. enacted by the statute of 3 Henry VI. (1424). It is possible that freemasons, no less than other men, were affected by the spirit of the Reformation and the speculations of Bacon on the possibilities of natural laws in the satisfaction of human needs. Be the psychological connection what it may, F. received a fresh impulse towards the latter part of the seventeenth century, when a general assembly of masons resolved to extend Masonic privileges to other than operative masons, to adopt anc. symbols of fraternity, and, generally, to revive the system of F. The antiquary Elias Ashmole is credited with being the first amateur or speculative member 'accepted' (1646), and the name of James Anderson, a Scottish minister, is commonly associated with the work of revival. The constitution of one grand lodge, composed of provincial or other smaller lodges, presided over by a grand master, dates from 1717 (*see above*), and it is from this time, too, that the prerogative of creating new lodges was vested in the grand master. Later, provincial grand masters were appointed, and

the purpose of speculative F. tended more and more to become purely benevolent. Still later the requirement in members of a knowledge of ordinary masonry was dropped, although even now the association, when laying foundation stones, does so with full masonic honours. Its members as a whole profess benevolence and charity rather than architectural or stone-cutting skill. 'The principles and tenets of our crafts,' says Churchward, 'are the highest principles of morality, charity, truth, and justice, which we have received as a sacred legacy from our forefathers, teaching us by sign and symbol those duties we owe to others and ourselves.'

F. is less popular on the Continent than in Great Britain. The Pope issued a bull excommunicating freemasons in 1738, and F. was one of the errors condemned by the syllabus of 1864. In France, however, F. was from its very inception early in the eighteenth century strongly favoured by the nobility, in spite of imperial censure and papal bulls. Notable Fr. masonic orders of the eighteenth and early nineteenth centuries were La Félicité, La Grande Loge Anglaise de France and La Grande Loge Nationale (afterwards the Grand Orient), and the Suprême Conseil; one at least of which was nothing more than a Jacobite combination. It is said that the general atmosphere of Fr. F. was low, and colour is given to this assumption by the fact that admission to membership could be purchased without any inquiry into character. Later, Fr. F. became infected with mysticism and the most grotesque 'degrees.' In France, as in Italy, Hungary, and elsewhere on the Continent, there is a strong tendency for F. to become involved in politics and, thereby, to incur the hostility of the state. For this reason, relations between British and Fr. freemasons have never been close. Prior to the Great War, the Grand Orient had some 300 lodges; but owing to their political activities, but still more on account of the exclusion from their rules of the familiar reference to the Great Architect of the Universe, the 'regular' grand lodges have seceded from the Grand Orient, and for the past seven years there has existed a new body which styles itself the Grande Loges Nationale indépendante et régulière. The Suprême Conseil, which at one time was amalgamated with the Grand Orient, has some 60 lodges. In Italy, F. has been dissolved by Fascist decree (*see also ITALY*). In Germany the advance of F. was furthered by the brilliant

intellectual support of such men as Lessing, Herder, Fichte, and Goethe.

F. was first introduced into the U.S.A. in 1730, when a deputation from the Grand Lodge of England appointed Daniel Cox Provincial Grand Master for Pennsylvania, New York, and New Jersey. In the U.S.A. masonry has flourished. The last official figures showed there were 49 independent Grand Lodges in the U.S.A. having 16,508 constituent lodges on their rolls, with a total membership of 3,306,349. The total membership for Canada was 202,498. The American Grand Lodges, and the number has doubled since that time, are in full affiliation with all other Grand Lodges except those under the jurisdiction of the Grand Orient of France.

Freemasonry received a great increase in membership during and immediately after the Great War. Young men in particular became members of the craft. The great influx that took place may probably be accounted for by the fact that during that tense period when these young men were called upon to face death as a normal incident in their daily lives, some were content to live for the day, not caring for the morrow, while others were prone to regard with all seriousness that life which they held by such slender threads. Of the latter there were many who became interested in freemasonry and joined the craft. Between 1914 and 1930 the total world membership increased approximately by 100 per cent. While it is difficult to ascertain the exact numerical strength of freemasonry, authorities put it down at round about four million, with particular strength in those parts of the globe inhabited by the English-speaking races. Within the craft there has been a marked tendency of late to take a much greater interest than hitherto in the intellectual side of the subject: numerous study circles have been formed in the lodges and lectures have become increasingly popular. Research, a difficult undertaking in respect of freemasonry, is being pursued with much greater zest and is not now confined to a few intellectuals and lodges established for the purpose. Latterly there has been a spiritual movement which has endeavoured to establish a connection between the rites and ceremonies of freemasonry and the mysteries of the early church.

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masonry; Fort, *The Early History and Antiquity of Freemasonry*; W. L. Wilmshurst, *The Meaning of Masonry*, 1922; W. L. Wilmshurst, *The Masonic Initiation*, 1924; A. E. Powell, *The Magic of Freemasonry*, 1924; M. M. Johnson, *Beginnings of Freemasonry in America*, 1924.

Freeport, the co. seat of Stephenson co., Illinois, U.S.A., on the Pecatonica R., 100 m. N.W. of Chicago. There are numerous manufs.—machinery, carriages, shoes, etc.—large railway shops, and dairies. A granite boulder commemorates the famous debate between Lincoln and Douglas, in which the latter maintained the so-called 'Freeport doctrine' on slavery. Pop. 22,045.

Free Port (It. *porto franco*), a harbour where ships of all nations may enter and load and unload by paying a moderate and uniform toll. F. Ps. facilitate transit trade, and form a kind of foreign district within a state. They are employed as depots, where goods are first stored free of custom duty; and then the goods may be either re-shipped for export (on payment of transit duty), or admitted for home consumption, when, of course, the usual full customs of the country have to be paid. F. Ps. have been established at Hong-Kong, Singapore, Copenhagen, and New Orleans; and the coaling-stations of Gibraltar, St. Helena, and Aden are nominally F. Ps., though not absolutely so.

Free Reed (Fr. *auche libre*), in musical instruments a thin metal tongue fixed at one end over an orifice and vibrating freely, either in surrounding space, or enclosed in a pipe or channel. An example of the former is seen in the concertina and accordion, and of the latter in an organ or harmonium. The most valuable characteristic of the F. R. is its power of producing all the delicate vibrations of tone from forte to piano, by virtue of the law of acoustics governing the vibration of F. Rs., whereby increased pressure of wind produces proportional increase in the volume of tone. See H. Helmholtz, *Die Lehre von der Tonempfindungen*, p. 166, 1877.



ORGAN
PIPE
SHOWING
FREE (F)

Free Soil Party, The, the name given to a political anti-slavery party in U.S.A., formed in 1848, which lasted till 1855, and then became one with the Republican party. It was originated by a union of the anti-slavery Whigs and Democrats with the Barnburners. It nominated Van

Buren for the presidency, but he was defeated in 1848. It was really a combination of the political abolitionists, many of whom had been formerly identified with the more Radical Democratic party, the anti-slavery Whigs, and a faction of the Democratic party in the state of New York.

Freestone, a building stone that is granular in structure and can be split readily in any direction. The name appears to have reference to this even quality. Stones used as Fs. are usually sandstones or limestones. Though fairly compact in structure, they are free from irregularities, and there is no distinct cleavage. They may be quarried in large blocks and dressed or carved in any fashion without risk of breakage. The Fs. of the N. of England are usually sandstones; those of the S. and W. are limestones. The limestones are called oolitic because the granules of which they are composed are egg-shaped.

Freethinkers, a term used of all who reject belief in divine revelation, applied especially to the deistical writers of the seventeenth and eighteenth centuries in England. The name was accepted by the rationalists as expressing persons who thought freely for themselves on all questions, including ecclesiastical and theological subjects. See Lechler, *Geschichte des Englischen Deismus*, 1841; Farrar, *Critical Hist. of Free Thought*. See DEISM.

Freetown, the cap. of British Sierra Leone, W. Africa, situated at the mouth of the Sierra Leone R., near the coast. It has a fine harbour protected by fortifications and is a British coaling station. It contains wharves, gov. offices, barracks, the governor's residence, a cathedral, Supreme Court, a technical school and Fourah Bay College. The chief exports are indiarubber, palm oil, resins, hides, and gold and silver filigree work which is made by the natives. The town is divided into two principal parts, the negroes inhabiting one quarter, and the better part of the town being in the possession of the Europeans, immigrants, etc. Since the marshes have been drained F. is much more healthful. Pop. 44,000.

Free Trade, an economic doctrine which advocates equality of treatment of all commodities for the purposes of taxation, irrespective of whether they are produced at home or abroad. Taxes levied on commodities purely for revenue purposes, without differentiation between the home produce and imported goods, are no violation of this doctrine. F. T. was first advocated by Adam Smith in his *Wealth of*

Nations, 1776. As the national wealth increases by allowing each individual freely to engage in that occupation most fitted to his capacity, and to exchange his product in order to procure whatever other commodities he requires, so the general prosperity of the world would be enhanced by each nation devoting itself to those branches of industry specially suited to it, and exchanging its commodities, without hindrance, with other nations. The question of trade is, however, regarded from a national and not from a universal standpoint, and though it is seldom denied that universal F. T. would be advantageous, it is frequently upheld that from a national point of view the protection of home industries is highly necessary. The present (1931) campaign for Empire F. T. emphasises this position. Free traders assert that under F. T. articles are bought at the cheapest prices and therefore produced in the most economical way, involving saving of labour and capital. Moreover, as a country pays for its imports by its exports, to allow free importation is also to encourage corresponding production along other lines. Again, competition, by bringing the home producer into contact with foreign rivals, stimulates his commercial zeal and forces him to adopt every improvement of process. As a negative argument, it is urged that even though protection might theoretically be defensible, govts. are not sufficiently wise to apply it beneficially. The fact that protected countries have generally found it necessary to impose a constantly increasing tariff against foreign goods is held to prove that such tariffs do not act effectively. The argument for protection is necessarily urged from a national point of view. It is alleged that a system of protection would render possible the carrying on of those branches of industry which are crushed by foreign competition, thereby affording greater openings for home capital and labour, and also provide a means of raising revenue. These two claims are necessarily, to some extent, antagonistic, as the revenue would diminish in proportion to the cessation of foreign competition. It is also frequently stated that although F. T. is advantageous as a normal condition of industry, nevertheless, in certain circumstances, protection is justifiable. Thus, in a new country, protection is held to foster rising industries. Where a country possesses but a limited stock of a valuable commodity, an export duty is advocated as a means of preventing its too

rapid exhaustion. The contention is also made that a country which allows free imports is at a disadvantage in dealing with a country which does not do so. Hence the policy of retaliation, which has for its object the imposition of duties upon the goods of a certain country in order to force that country either to abolish or to reduce an unfavourable tariff. The dependence of Great Britain on foreign countries for its food supplies, which would prove prejudicial in case of war, and was demonstrated with unpleasant clearness in the Great War, is held to be a reason for endeavouring to stimulate home food production by means of a duty. Great Britain has adopted the system of F. T. since 1860, but a campaign was started in 1903 by Joseph Chamberlain, then Colonial Secretary, for the institution of a system of Imperial Preference (*q.v.*), based on the necessity of preventing the alleged decline of British trade, and at the same time uniting the colonies more closely to the motherland by mutual commercial interests. The latter part of the scheme involved the imposition of food taxes, which proved to be the least favoured part of the programme. The scheme was, however, accepted by the larger portion of the Unionist party, and gave rise to the fiscal controversy that has animated British political life since that date. The emergencies of the Great War necessitated a modification of British Free Trade policy, and in 1915 Mr. McKenna (*q.v.*) imposed duties upon certain imported articles (including motor-cars, cinema films, clocks, musical instruments, plate-glass sheets) in order to restrict demands made upon cargo space in vessels needed primarily for the transport of food. In 1917 the gov. agreed to a scheme of 'Imperial Preference within the Empire,' with special reference to 'Key Industries.' In 1921 a rebate of duty on Empire goods was granted. In the same year the Safeguarding of Industries Act (*q.v.*) was passed. The return of the Conservative Party to power in 1924 saw the following programme adopted: raisins, figs and plums produced within the Empire, free of duty; Empire sugar to be protected to the extent of 4s. 3½d. a cwt. for a period of 10 years; Empire tobacco preference by one-twelfth; wine from one- to two-thirds and currants to be free. The McKenna Duties were abolished by the Labour gov. of Aug. 1924 to July 1925, but the succeeding Protectionist gov. reimposed them for a period of five years. In 1926 the duties on foreign cars (33½ per cent.) were extended to commercial cars,

while a duty of from 1s. to 7s. 9d. a pound was levied on imported artificial and natural silk. The following articles were added: cotton fabric gloves, gas mantles, cutlery, packing paper, translucent pottery, enamel hollow-ware and buttons. In 1930 the duty was removed from imported fabric gloves, and those articles included in Pt. II. of the Safeguarding Act of 1921 (*q.r.*).

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Free Verse is considered by Robert Graves to be prose poetry broken up into convenient lengths, but with this many of his contemporaries disagree. Milton, in *Samson Agonistes*, achieved a form of Eng. F. V., although strictly he attempted to write Eng. poetry according to Gk. metrical laws. *Vers Libre* was practised in France in the eighteenth century by La Fontaine and in a different form in 1890 by the Symbolists. Walt Whitman invented his own F. V. measure, which contemporary poets do not claim to have used. It was before the Great War that F. V. began to be practised extensively. Poets who used it considerably were those who were known as the Imagists, and included Ezra Pound, H. D., F. S. Flint, Amy Lowell, D. H. Lawrence and Richard Aldington. These poets believed F. V. to apply to poetry written in rhythms more marked and definite than prose, but not so violently accentuated as those used in regular verse, and felt that the individuality of a poet could often be expressed better in F. V. than in the more conventional forms of poetry. The movement in favour of F. V. has now spread over Europe and N. and S. America. The following quotations from Ezra Pound illustrate the method and attitude of a F. V. poet.

Go, my songs, seek your praise from
the young and from the intolerant,
Move among the lovers of perfection
alone.
Seek ever to stand in the hard Sopho-
clean light
And take your wounds from it gladly;

and also :

Go, little naked and impudent songs,
Go with a light foot !
(Or with two light feet, if it please
you !)
Go and dance shamelessly !
Go with impertinent frolic.

Free Will, *see* DETERMINISM and WILL.

Freezing, the change from a liquid to a solid state. This is effected by cooling the liquid to a definite point of temperature, which is invariable for the same substance under similar conditions of pressure. So well is this recognised that the freezing-point of water is one of the standard thermometric points, the other being the boiling-point of water. In the centigrade and Réaumur scales the freezing point of water is 0°, in the Fahrenheit scale it is 32°. The temperature at which a solid melts is usually the same as that at which the liquid form solidifies, therefore freezing-point and melting point are interconvertible terms. After a liquid has been brought down to its freezing-point by abstraction of heat, still further abstraction of heat must occur before it can assume the solid form. The amount of heat which is thus absorbed without change of temperature is called the latent heat of fusion. When a substance solidifies to an amorphous solid, the process of transformation is a gradual one; that is, the liquid gets more and more viscous, until it becomes solid throughout. When a substance solidifies to a crystalline state, the change is sudden and solid and liquid portions remain in contact; this is the case with water. Some substances, after contracting through a long range of decreasing temperature, expand just before the freezing-point is reached. Water behaves in this way; hence ice is lighter than water, and the effect of pressure on the liquid is to lower the freezing-point, as expansion is thereby retarded. The addition of an impurity, as salt or sugar, to water also lowers the freezing-point. When any portion of the water solidifies, the substance dissolved is separated out, and dissolves in the portion still liquid. This process absorbs heat, so that solidification is hindered. The liquid portion gradually becomes more concentrated until it is saturated, after which the salt or sugar appears in the solid mass. It is not, however, in solution, but is in the form of small crystals embedded in the mass of ice.

Freezing Mixtures, mixtures of substances which have an affinity for each other, such that heat is ab-

sorbed by their combination or solution. The commonest F. M. is ice and salt, which should be kept well stirred. The lowering of the temperature is caused by the affinity of salt and water; a solution is formed, both ice and salt being transformed into the liquid state, heat being abstracted from the mixture and surrounding objects to effect this. As long as there is still a supply of ice and salt, the process of solution goes on until a definite limit of temperature (—23 C.) is reached, at which limit the two substances become solid together, forming a *cryohydrate*. Other F. M. are: powdered sodium sulphate, or ammonium nitrate with water, temp. —15°; sodium sulphate, eight parts, hydrochloric acid, five parts, temp. —17°; sodium phosphate, nine parts, dilute nitric acid, four parts, temp. —29°; crystalline calcium chloride, ten parts, snow or powdered ice, seven parts, temp. —55°. A mixture of solid carbon dioxide and ether is a valuable F. M., while solid carbon dioxide itself ('dry snow') is used in the ice-cream industry. For very low temperatures, liquid oxygen, or even liquid hydrogen, may be used.

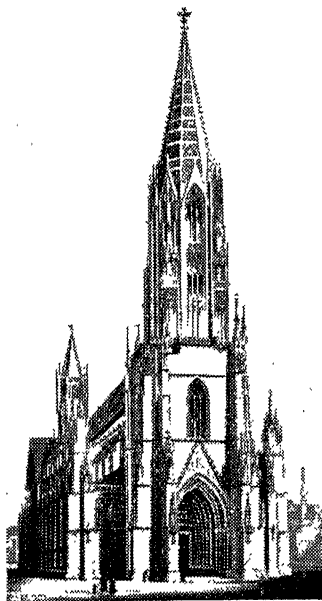
Fregenal de la Sierra, a tn. of Spain, in the prov. of Badajoz, and 50 m. S.S.E. of that city. It is situated in a fertile valley and the town is well laid out with good streets. It has an old castle which was erected by the Templars. There is considerable trade in cattle, and an annual fair is held here. The industries are woollen and baize manufacture and flour mills. Pop. 10,000.

Freiberg, a tn. in Saxony, Germany, on the R. Munzbach, on the N. slope of the Erzgebirge, and 19 m. S.W. of Dresden by rail. It is the seat of the administration of mines throughout the kingdom of Saxony and has a famous mining academy, formed in 1765. There are also large smelting works and foundries. F. has extensive manufactures of gold and silver lace, woollen, linen, and cotton goods, iron, copper, and brass wares, gunpowder and white lead. It has many fine old buildings, one of the most interesting of which is the cathedral: the S. portal, or 'Golden Gate,' is a fine example of mediæval Ger. art. It has a large organ built by Silbermann. Adjoining the cathedral (1484, restored 1893) is a mausoleum containing the burial vaults of the electors of Saxony from 1594–1694. In the neighbourhood are found gold, silver, and lead, zinc, bismuth, nickel, cobalt, and arsenic. Pop. 35,000.

Freiburg, a tn. in Moravia, situated 40 m. E.N.E. of Olmütz. Pop. 4000.

Freiburg (Switzerland), see **FRI-BOURG**.

Freiburg-im-Breisgau, a city and archiepiscopal see of Germany, in the grand-duchy of Baden, 40 m. N.E. of Basel, at the foot of the Black Forest range. It possesses a famous university founded in 1457 and attended by 2000 students. The cathedral is one of the most perfect specimens of Gothic architecture in Germany, cruciform in shape and built of red sandstone, and probably dates from be-



FREIBURG CATHEDRAL

tween 1122 and 1252; the tower, 386 ft. high, is one of the finest in Europe. Among the other buildings are the palaces of the grand-duke and archbishop, the 'Kaufhaus,' and the old town hall. The chief manufactures are buttons, chemicals, starch, leather, tobacco, silk thread, paper, beer, and wine. Since 1821 it has been the seat of a Rom. Catholic archbishop. F. became a free town in 1120; it fell twice into the hands of France (1677-97 and 1744-48), played an important part in the Thirty Years' War, and finally passed to Baden in 1806. Pop. 90,000.

Freienwalde, a summer resort and

watering-place in the prov. of Brandenburg, Prussia, on the R. Oder, 28 m. N.E. of Berlin. Its forest and chalybeate springs make it a popular resort. Pop. 9000.

Freight, originally the cargo of a ship, it has now come to mean anything carried for payment either by water or land, whence the term is used for the price paid to the ship-owner for the transportation of goods. It was formerly considered that the total F. must cover the wages of the crew and the incidental charges and expenses of the shipping business as well as the interest and depreciation of the capital invested in the shipping. 'Freight was the mother of wages,' but this was modified by the Merchant Shipping Act, 1854. In recent years, owing to the general use of steamers and their increased size, the cost of carriage has been considerably reduced, with a resulting great increase in trade. (See **INTERNATIONAL TRADE**.) Some bulky articles of cargo are sometimes carried at a very low rate because of their usefulness as ballast where a return cargo is sought. See Giffen's *Essays on Finance* (2nd. series), 1880-6; *The Statistical Journal*, vol. lxii.; Jevon's *Coal Question* (chap. xiii.), 1866, for the distribution of F. charges; and MacLachlan's *Law of Merchant Shipping*, 1880, for the law of Fs.

Freischütz ('free shot'), in Ger. folklore, a marksman who has obtained a number of magic bullets (*Freikugeln*) from the devil, six out of every seven of which always hit the mark, while the seventh is at the disposal of the devil himself. The legend, with various modifications, was most prevalent during the fourteenth to the sixteenth centuries, but it first received literary form in Apel's *Gespenserbuch*, 1810, from which it was adapted by F. Kind for Weber's opera, *Der Freischütz*, 1821. See Grässe's *Die Quelle des Freischütz*, 1875.

Freising, or **Freisingen**, a tn. of Upper Bavaria, Germany, situated on the Isar, 16 m. N.N.E. of Munich. It is of anct. origin, and supposed to have been founded by the Roms.; it was made a bishopric in 724. In 1802 the see was united to the bishopric of Munich, then newly created. The cathedral is noted for its remarkable crypt. There are distilleries, breweries, saw-mills, dye-works, manufs. of machinery, and a royal model farm. Pop. 15,000.

Fréjus (Rom. *Forum Julii*), a tn. in the dept. of Var, France, 22 m. S.W. of Cannes. It has been an episcopal see since the fourth century, and has sardine and anchovy pickling works. The town was founded on the

site of an earlier village by Julius Cæsar, and contains many Rom. remains, including walls, a light-house, an amphitheatre, and an aqueduct. It is now a health resort. Pop. 4000.

Frelinghuysen, Frederick Theodore (1817-85), an American lawyer and statesman. He graduated at Rutgers College (1836), and was soon after admitted to the Bar. He was Attorney-General of New Jersey, 1861-8; U.S.A. senator, 1867-9 and 1871-7; U.S.A. minister to England in 1870, and Secretary of State from 1881-5.

Fremantle, the chief seaport of W. Australia, situated at the mouth of the Swan R., 12 m. S.W. of Perth. The harbour is exposed and not, naturally, good, but has been vastly improved. The town hall is a handsome building, erected at the cost of £12,000. There is an episcopal church and a recreation ground. On the main island in the harbour are gov. salt works. The principal manufactures are leather, flour, beer, lumber, soap, and iron and steel goods. Pop. 29,000.

Frémiet, Emmanuel (1824-1910), a Fr. sculptor, b. in Paris, was the nephew and pupil of Rude; he chiefly devoted himself to animal sculpture and equestrian statues in armour, singly and in groups, the best of which are: 'Joan of Arc,' 1874, in the Place des Pyramides, Paris; 'Condé,' 1881; 'Joan of Arc,' 1889, at Nancy; 'Velasquez' in the Jardin de l'Infante at Paris. He also excelled in imaginary groups, chiefly of animals: 'Gazelle,' 1843, exhibited at the Salon; 'Gorilla carrying off a Woman,' 1887. He became a member of the Académie des Beaux-Arts in 1892. See Life by Biez, 1900.

Fremont: (1) A city of N. Ohio, U.S.A., and the cap. of Sandusky co. It is situated on Sandusky R., about 30 m. S.E. of Toledo, and 105 m. N.W. of Columbus, in the midst of a petroleum region. The chief manufactures are cigars, lime, agricultural implements, cutlery, hardware, paper, machines, boilers, etc. Pop. 13,422. (2) A city of Nebraska, U.S.A., and cap. of Dodge co., situated on the Platte R. There are stockyards and packing-houses, and it is an important market for grain. There is a normal school situated here. Pop. 11,407.

Fremont, John Charles (1813-90), one of the greatest of American explorers who opened up the far west, was b. at Savannah, Georgia. In 1837, after graduating from college, he accompanied a railway survey party through Georgia, Tennessee and North Carolina. Later he sur-

veyed Nebraska, the Dakotas, Iowa and Minnesota. From 1842 to 1854 he explored Oregon, New Mexico and California. When the war with Mexico broke out in 1846, General S. W. Kearny was ordered to take possession of the territory of California, but when he arrived, he found his work had already been done by F. Mexican forces had moved against unwelcome American settlers, but F. with volunteers had already beaten him and driven him out of the country. The Americans there chose F. as their governor, all this taking place before they even knew their country was formally at war with Mexico. F. had a quarrel with General Kearny, was court-martialled and dismissed the service, but was pardoned by the President. He came into national notice again in 1856 when the Republican party was founded. Although it had far abler men in its ranks, it nominated F. for President. The Democrats named James Buchanan. The latter attacked F.'s character, accusing him of corrupt dealings in California. In the heated campaign it became evident to thoughtful men that if F. were elected, it would mean the secession of the southern slave-holding states, as F. was an ardent free-soiler. Buchanan was elected. In later years, when under Lincoln the much-dreaded civil war did break out, F. was for a time in charge of the military department of the west with headquarters at St. Louis. He was soon under grave charges of incompetency and flagrant misuse of his authority; of sending men to prison without cause and of corruption in giving out contracts. But his worst blunder was that, without consulting the President, he issued a proclamation confiscating the property and freeing the slaves of all Missourians who took up arms against the government. President Lincoln removed him from his post, but afterwards gave him a chance to serve in an important command. F. declined. He was ruined in later years in railway speculations and was governor of the territory of Arizona 1878-81.

French, Daniel Chester, American sculptor, b. at Exeter, New York, 1850; studied at Boston and had studios at Washington, Boston, Mass., Concord, Mass., and New York. His best-known works are a statue of Gen. Cass at Washington; Rufus Choate at Boston Court House; John Harvard at Cambridge, Mass.; the Millmore Memorial, Paris Salon, 1892; statue of the Republic at Chicago Exposition; four groups, Europe,

Asia, Africa, and America, in front of New York Custom House; Abraham Lincoln at Lincoln, Nebraska.

French, Sir John Denton Pinkstone, *see* YPRES, EARL OF.

French and Indian War (1754-60), last of series of wars between France and Great Britain, the Fr. being assisted by several Indian tribes. The principal events of it were; Capitulation of Washington and Fort Necessity, 1754; Braddock's defeat, 1755; capture of Oswego and Fort William Henry by Gen. Montcalm, 1756-7; capture of Fort Duquesne, 1758; and of Ticonderoga and Niagara, 1759; battle of Quebec, 1759; surrender of Montreal, 1760.

French Congo (now Fr. Equatorial Africa), a colony of France on the W. coast of Africa between Cameroon and the Belgian Congo, bounded by the Mbomu, Congo, and Ubangi rivers, and stretching inland, northwards, to L. Chad. The estimated area is 912,049 sq. m., with a pop. in 1926 of 3,127,707, of whom some 2500 were European. By decree in 1906 the name of the colony was changed to 'French Equatorial Africa,' comprising the Gabun Colony (capital Libreville), the Middle Congo Colony (capital Brazzaville), the Ubangi-Shari-Chad Colony (capital Bangui), and all put under the authority of the governor-general of Fr. Equatorial Africa. Each colony has, however, its own administrative council under a lieutenant-governor. In 1920 the Chad Territory was separated from Ubangi-Shari-Chad, and made a separate colony (capital, Fort Lamy). The boundary between it and the Anglo-Egyptian Sudan was defined in 1924. By the convention of Nov. 14, 1911, France agreed to cede certain parts of the colony to Germany in return for the recognition of her Protectorate in Morocco; the amount ceded was about 107,270 sq. m. with a population of about 1,000,000. At the same time Germany ceded to France 6450 sq. m. of the German Cameroons. The low-lying coast extends about 200 m., broken by the mouths of the Gabun (estuary 10 m. wide), and Ogowe rivers. Behind the coast rise the Crystal Mts. (3000-4500 ft.), and a general plateau (3000 ft.) deeply cut by the river valleys. The climate is equatorial, but varies greatly in temperature on the coast and in the mts. In some districts 120-130 in. of rain fall annually. Most of the colony is still unexploited, and there is undoubtedly an enormous quantity of valuable timber in the dense, tropical forests. The natives cultivate manioc, and the Europeans coffee, vanilla, and cocoa. The

natural products include rubber, gold, copper, zinc and lead. The chief exports are rubber, ivory, woods, palm oil and kernels, coffee, cocoa, and kola nuts. In 1928 the estimated value of the exports was 151,318,963 francs; of the imports, 227,656,279 francs. In the Chad colony, cattle and sheep, horses, asses, camels and ostriches are reared, but owing to lack of communications the export of them is next to impossible. In 1921 a railway was commenced to join Brazzaville to the coast at Pointe Noire, but many more railways are necessary before the rich potentialities of the district can be realised. Libreville and Port Gentil are the chief ports.

French Gardening, *see* GARDENING, *Intensive Cultivation,* or *French Market-gardening.*

French Guiana, or Cayenne, French colony on the N.E. coast of S. America, separated from Dutch Guiana on the W. by the Maroni R., and from Brazil by the Oyapok and the Tumuc-Humac Mts. Other rivers are the Aoua, Aprouagua, Cayenne, Sinnamarie, and Mana, all obstructed by falls. The country is divided into three natural belts: the rugged, mountainous, little-known interior, covered in dense forest rich in valuable timber, the grassy savannah-land of the foothills, and a narrow belt of rich alluvial land along the coast. This last is very fertile, and here, though only about 8000 ac. have been cultivated, maize, manioc, rice, sugar-cane, coffee, cocoa, tobacco and indigo are grown. There are two rainy seasons, and the rainfall frequently amounts to 135 in. in a year. The country is rich in animal and vegetable life. The minerals exploited include silver, iron and phosphates, and, most important of all, placer gold. The principal exports are gold, cocoa, phosphates, hides, woods, rosewood essence, balata and spices, of which gold is by far the most important; and the chief imports are French wines, spirits and liqueurs, silk and cotton stuffs, hardware, flour, and cattle. The exports in 1928 amounted to 29,799,434 fr., the imports to 55,528,300 fr. From 1853-64 an attempt was made to found penal colonies in French Guiana, but proved disastrous. Since 1885, however, Cayenne has had a penal settlement, the population of which, in 1929, was about 4000, though no prisoners had arrived there since 1927. There are also penal settlements on the Iles du Salut, and on the Maroni R. In 1894 Captain Dreyfus was confined on the Ile du Diable. Cayenne is the capital and chief port of the colony, which sends

one deputy to the French National Assembly. St. Laurent-du-Maroni and Oyapoc are the two other chief ports. Cayenne has been colonised by the French since 1604. Total area 34,740 sq. m. Pop. (1926) 47,341. The number of the native population, which dwells in the forested interior, cannot be estimated.

French Guinea, a French colony on the W. coast of Africa, formerly known as *Rivières du Sud*. It lies between Sierra Leone and Portuguese Guinea. The principal products are rubber from the interior, palm oil and kernels on the coast: cotton is cultivated in the higher basin, and millet, sesame, rice, coffee, bananas, pine-apples, wax, and ivory are largely produced. Cattle, sheep and goats are reared, and gold is found in some districts. The chief imports are cotton goods, metal goods, wines, tobacco, petrol and salt. In 1928 the value of the imports was 106,115,443 fr., and of the exports, 72,174,419 fr. At Camayenne, near Konakry, the capital of the colony, is an experimental garden. The French Guinea Rly., 412 m. long, runs from Konakry on the coast to Kourassa on the Niger, and on to Kankan, and many good roads are being built to connect up with the rly. Konakry, which has a jetty over 1000 ft. long, is served by three French and one English shipping companies. French Guinea is administered by a lieutenant-governor under the direction of the governor-general of French West Africa. Geographically, the colony is divided into three districts—a flat, coastal plain, a series of lofty plateaus, and the mountainous district of Fontan Djallon, where cattle are reared. French Guinea was made a separate colony from Senegal in 1891, and its boundaries finally settled in 1899. Total area, 89,436 sq. m. Pop. 2,095,988, of which 2262 are European. The chief native tribes are the Foulahs, Sous-sous and Timenes. See André Arcin, *La Guinée Française*, 1906; and F. Rouget, *La Guinée*, 1908.

French Honeysuckle, see HONEY-SUCKLE.

French India. The French possessions in India comprise the five provinces of Pondicherry, Karikal, Chandernagur, Mahé, and Yanam, each with its capital of the same name. The chief crops are manioc, paddy, rice and ground nuts; chief exports, oil-seeds. There are cotton and jute mills. Total area about 193 sq. m., and a pop. of 275,000.

French Indo-China, see INDO-CHINA, FRENCH.

French Language, see FRANCE.

French Revolution, The, see FRANCE, History.

French River, a stream in Ontario, Canada; it empties Lake Nipissing into Lake Huron and enters Georgian Bay after a rapid course of 60 m.

French Shore, the neutralised ter. between Capes St. John and Ray on the N.E. and W. coasts of Newfoundland, where the French have the rights of fishing.

French Somaliland, see SOMALILAND and JIBUTI.

French West Africa, see FRENCH GUINEA, DAHOMEY, IVORY COAST, NIGER, SAHARA, SENEGAL, SENEGAMBIA, WADAI.

French West Indies comprise the islands of Martinique, Guadeloupe, Marie-Galante, Désirade, St. Bartholomew, and part of St. Martin in the Lesser Antilles.

Frère, Sir Henry Bartle Edward, first Baronet (1815–84), a statesman, entered the Bombay civil service in 1834, and remained in India for thirty-three years, during which in various posts he rendered yeoman service to the country. During the Mutiny he did invaluable work in connection with the relief of the Punjab, for which he was thanked by parliament, and in 1859 appointed a member of the viceroy's council. Returning to England, 1867, he held various offices, and in 1877 was made governor of Cape Colony and High Commissioner of S. Africa. Under his rule occurred the first Boer War and the struggle with Cetewayo. In 1880 he was recalled for having exceeded his instructions. He defended himself in *Afghanistan and South Africa*, 1881, and other publications. There is a biography by John Martineau, 1895.

Frère-Orban, Hubert Joseph Walther (1812–96), a Belgian statesman, b. at Liège. He practised for some years as a barrister in Liège, where he took a prominent part in the Liberal movement. In 1847 he was elected Liberal member for Liège in the Belgian parliament, becoming Minister of Public Works in the same year. From 1848 to 1852 he was Minister of Finance, and by his foundation of the Belgian Banque Nationale successfully tided over a financial crisis. Owing to the unpopularity of a proposed commercial treaty with France he resigned in 1852, but his publication of *La Main-Morte et la Charité*, 1854, helped to restore his party to power in 1857; he was again Minister of Finance until 1870. In 1878 he became President of the Council and Foreign Minister, but the opposition of the Clerical party and the Radicals led to his fall in 1884. F. published *La Question Monétaire*, 1874, and *La Question Monétaire en Belgique*, 1889, and numerous pamphlets.

Freret, Nicolas (1688–1749), a Fr.

scholar and historical critic, *b.* in Paris. He was destined for the law, but his earliest inclinations led him to the study of history, chronology, and mythology. In 1714 he was admitted as pupil to the Academy of Inscriptions, where he read his discourse *Sur l'origine des Francs*. For his novel opinions expressed in this work he was confined in the Bastille on a charge of 'libelling the monarchy.' In 1716 he was made an associate of the Academy of Inscriptions, and in 1742 perpetual secretary. Among his other works are a treatise on the origin of the Gks., *Observations on the Cyropaedia of Xenophon*, and *Historical Researches respecting the Ancient Peoples of Asia*, in which he explodes the theory of the fabulous antiquity of the Chinese.

Frere Town, or **Kisauni**, a tn. of British E. Africa, situated 2 m. N.E. by N. of Mombasa. It is important as the headquarters of the Church of England Missionary Society in British East Africa.

Frescobaldi, Girolamo (1583-1644), an Italian organist and musical composer, *b.* at Ferrara. He first gained a reputation as a singer, but later was renowned for his organ music. He was organist of St. Peter's, Rome,



GIROLAMO FRESCOBALDI

1608-28, and again from 1633 to 1643. He was an excellent teacher, and numbered J. J. Froberger, the Ger. organist, among his pupils. His compositions include various forms of both instrumental and vocal music, his canzone and madrigals being especially noteworthy.

Fresco Painting, a process of mural painting on plaster which is still *fresh*

(Ital. *fresco*) or wet. F. P. is executed on a brick or stone wall which must, first of all, be perfectly dry. The plaster to be applied is composed of lime and water prepared a year before it is wanted and then mixed with sand at the time of using. Several coatings of this preparation are applied, but the first ones only—the *arriccio*, half an inch thick—to the entire wall at once. The two finer coatings—the *intonaco*—are applied only to that portion of the wall which it is intended to paint in the day, so that it may not be dry before receiving the pigments. The reason for this is that in the process of drying a crystal surface of carbonate of lime forms over the plaster, and it is essential that the pigments should be there ready to receive this coating, for it is protective to them and gives them clearness. When the plasterer has covered the portion of wall to be painted, the painter superimposes his cartoon and pricks off the outlines with an instrument of wood or bone, or makes an impression of it by pouncing. The cartoon is then removed and the colours are applied. The fresh plaster becomes thoroughly impregnated by them, and they are thus incorporated with the rock or stone of lime and sand which constitutes the plaster, and are therefore as enduring as the stone plaster if the process were carried out with perfection. The colours, which are principally earths or minerals, for these best resist the chemical action of lime, are ground up and mixed with pure water; they should be thin and transparent, and darker than required, for in drying they become paler. From its nature F. P. must be executed rapidly and its effects produced by single touches of the brush: therefore none but a master hand can exercise the craft with complete success. F. P. has sometimes been confused with the *in tempera* and *encaustic* methods of painting, which probably preceded it. The date at which it came into use cannot be fixed; it belongs to remote antiquity. Colossal figures painted *al fresco* have been taken from ancient Egyptian palaces and temples, and fragments have been recovered in Herculaneum and Pompeii which had lain for centuries beneath masses of earth and ruins. These had preserved all their original brightness of colour. The best exponents of the craft are Giotto, Masaccio, Ghirlandajo, Michaelangelo, and Lippi. Ruskin says that F. P. seems to have been practised at Verona in absolute perfection in the fifteenth century. Among modern fresco painters are Flandrin and Delacroix in France,

and Cornelius, Overbeck, Veit, and Schadow in Germany. The attempt in our own time to introduce F. P. in London has not been successful owing to the large quantities of sulphurous acid gas in the atmosphere.

Freshwater, a par. and seaside resort in the Isle of Wight, England, 10 m. W. of Newport. The acreage of the parish is 4836, and it forms the W. extremity of the island; the greater part of it is enclosed by the Freshwater R. It is noted for its interesting caves and as the residence of Tennyson during the latter years of his life. Pop. 3500.

Fresh-water Herring, see CORE-GONUS

Fresnel, Augustin Jean (1788-1827), a French physicist, b. at Broglie (Eure). He was an engineer of the Ecole des Ponts et Chaussées, and served in the departments of Vendée, Drôme, and Ile-et-Vilaine, but owing to his exposure of the Bourbon cause, lost his post on Napoleon's escape from Elba. Although he was reinstated, he had turned his attention to physics in the interval. In 1819 he was appointed a commissioner of lighthouses, and was the first to construct the compound lenses instead of mirrors. His discoveries finally established the undulatory theory of light, which had first been advanced by Thomas Young. See Duleau, 'Notice sur Fresnel,' in *Rev. Encyc.*; and Arago, *Œuvres complètes de Fresnel*, 1866-70.

Fresnes, a tn., dept. Nord, France, 5 m. N.E. of Valenciennes. It has manufs. of woollens, glass, and beet-sugar, and there are coal mines in the neighbourhood. Pop. 6700.

Fresnillo, a tn. in the state of Zacatecas, Mexico, 7700 ft. above sea-level, at the foot of the Cerro del Proano, and 37 m. N.W. of the city of Zacatecas; there are rich silver mines and some copper, and the town has large amalgam works. Pop. 27,000.

Fresno, a city and county seat of the co. of F., California, U.S.A., in the San Joaquin Valley, and 165 m. S.E. of San Francisco. It is a rich farming district, producing grains and fruit, especially Smyrna figs, and grapes for raisins and wine-making. The chief industries are the preserving of fruits, lumbering, and mining; the F. petroleum field is one of the richest in the state. Pop. 52,513.

Fresnoy, Charles Alphonse du (1611-65), a Fr. historical painter and writer, b. in Paris. His paintings show great correctness of design, and he was a good colourist, but his name is mainly remembered in connection with his writings, the chief of which *De arte graphica*, a Latin poem, is a

critical treatise on the practice of the art of painting.

Fret-work, Scroll-cutting, or Fret-sawing, the art of cutting thin boards or panels into decorative designs. The chief instrument used is the fret-saw, which varies in size according to the size of the work. The blade is held in a frame consisting of two side pieces kept apart by a cross-bar, fitted to them by a tenon at each end, but not fastened. In each of the handles a slot is cut into which the blade is placed and secured by a wire pin at one end and a movable pin at the other. The most important part is the blade, which may be of various sizes, some of them exceedingly minute. The pattern which is to be followed must first of all be carefully stuck on to the wood; a hole is then cut in the latter by means of a brace and bit or a bradawl. The fret-saw must be partially removed from the frame in order to be passed through this hole, and then screwed up again. At first a beginner will not be able to follow the pattern quite accurately, and his edges will be rough, requiring finishing off with a half-round file or sandpaper. Very pretty designs and ornaments can be produced by the expert, and fret-sawing as a hobby is widely popular. Three-ply veneer is a wood much used for fret-work. See J. Plane and C. G. Leland, *Fret-Cutting*; H. Dunning, *Fret-work and Marquetry* (Useful Arts and Handicrafts series), 1899, etc.

Freud, Sigmund, Professor of Neurology, Vienna University, famous as an exponent of psycho-analysis (q.v.). He was b. in Freiburg, Moravia, May 6, 1856, and educated at the Sperl Gymnasium, Vienna, and Salpêtrière, Paris. His first serious studies moved from law to natural science. Later he worked under Brücke in the University, Vienna, and in 1884 became assistant physician at the General Hospital. In 1885 F. became associated with Charcot, the Parisian neurologist, who taught that hysteria is of psychological origin and that ideas can produce physical changes, and F. returned to Vienna with his first inspiration to psycho-analysis. In 1895 he published with Breuer, *Studien über Hysterie*, outlining the theory that hysterical cases can be successfully treated while under hypnosis by freeing the pathogenic idea from the unconscious mind. He discovered, later, that the cure was not lasting, and abandoned hypnosis for suggestion. From this point he progressed rapidly with his studies and consequent discoveries in psycho-analysis, and published successively *Die Traumdeutung*, 1900, *Psycho-pathologie des Alltagslebens*,

1901, and *Drei Abhandlungen zur Sexualtheorie*, 1905. *Die Traumdeutung*, the significance of dreams, embodies some of his outstanding discoveries, among them the claim that the interpretation of dreams is an important factor in psycho-analysis, that the recollected parts of dreams are symbols of the activities of the unconscious mind during sleep when the will is ineffective and conscious self-control is suspended. In *Psycho-pathologie des Alltagslebens* the revolutionary nature of his theories aroused great hostility, and on many occasions his statements during lectures to doctors were met with open ridicule. Moreover, public interest was increasing (the Eng. translation of this work alone ran into edition after edition), and when he crystallised his theories in the assertion that nearly all cases of neurosis were due to the repression of sexual desires, a storm of criticism burst upon him. He possessed, however, a personality of unusual strength, and proceeded unmoved. He claimed to have made a further discovery in 1898, when he stated that sexual desires begin at birth rather than puberty. Coming at a time when any frank exposition upon sexual problems shocked the public idea of morality, the claim aroused still fiercer attacks. Informed observers, however, found much to interest them in the consequent doctrine that a disturbance in a child's sexual growth explains all cases of mental subnormality, and that under proper direction sexual impulses may be 'sublimated' into forces which can inspire the noblest achievements.

In 1903 he founded the Vienna Psycho-analytical Circle, and by 1906 branches were established in other countries. In 1908 his influence spread rapidly, and the first International Psycho-analytical Congress was held at Salzburg, Switzerland. In 1909 F. visited the U.S.A. and delivered a course of lectures at Worcester University. On his return the International Psycho-analytic Association was formed with the dual object of regulating propaganda and preventing its prostitution by insincere practitioners. The society meets annually and publishes leading works on the subject. There is a branch of its library in London.

Bibliography.—*Sigmund Freud*, Wittels, 1924; *The History of the Psycho-analytic Movement*, Sigmund Freud, 1916.

Freudenstadt, a tn. of Württemberg, Germany, in the Black Forest circle, 30 m. S.E. by E. of Strasbourg. It lies among the mountains, and parts of its ancient walls are still

standing. It possesses a peculiar triangular church. It manufactures woollen goods, knives, nails and has shops for cabinet making, and spinning mills. Pop. 9800.

Freund, Wilhelm (1806-94), a Ger. philologist and lexicographer, b. at Kempen, Posen. He took an important part in the movement for the emancipation of the Prussian Jews, and was largely instrumental in the 'Judengesetz' of 1847. His chief work is *Wörterbuch der lateinischen Sprache*, 1834-45, the chief basis of all subsequent Latin dictionaries.

Frequent, a tn. of France, in the dept. Pas-de-Calais, has manufs. of linen and woollen goods, and iron-works. Pop. 4800.

Freyberg, see FREIBERG.

Freyburg, a canton of Switzerland, see FRIBOURG.

Freycinet, Charles Louis de Saulces de (1823-1923), Fr. statesman, b. Nov. 14, at Foix; educated at Ecole Polytechnique, then entered gov. service as mining engineer. In 1856 he was appointed traffic manager to Compagnie de Chemins de Fer du Midi, a post where he gave evidence of his talent for organising; and in 1862 he returned to engineering service, in which he attained, in 1886, the rank of inspector-general. He was sent on a number of special scientific missions—among them one to England on which he wrote a notable *Mémoire sur le Travail des Femmes et des Enfants dans les Manufactures de l'Angleterre*, 1867. On the establishment of the Third Republic in 1870, he offered his services to Gambetta, and was appointed prefect of the department of Tarn-et-Garonne; and in October became chief of the military Cabinet. It was mainly his power of organisation that enabled Gambetta to raise army after army to oppose the invading Gers. He was a strategist of no mean order, but the policy of dictating operations to generals on the field was not attended by happy results. He entered the Senate, in 1876, as a follower of Gambetta, and in Dec. 1877 became Minister of Public Works in the Dufaure cabinet. In 1879 he became President of the Council and Minister for Foreign Affairs; and in 1886 he became Premier. In 1888 he became Minister of War in the Floquet cabinet, the first civilian since 1848 to hold that office. His services to France in this capacity were the crowning achievement of his life. In 1890 he was elected to the Academy. In 1893 he resigned from the War Office, somewhat under the shadow of the Panama scandals. Died in Paris, May 15.

Freycinet, Louis Claude de Saulces

de (1779-1842), a Fr. navigator, b. at Montélimart (Drôme). In 1793 entered Fr. navy; after taking part in several engagements against the British he joined in 1800, with his brother, Louis Henri F. (1777-1840), who after rose to rank of admiral, the expedition sent out under Captain Bandin in the *Naturaliste et Geographe* to explore the S. and S.W. coasts of Australia. Much of the ground gone over by Flinders was revisited and new names composed by this expedition, which claimed credit for discoveries really made by the Eng. navigator. An inlet on the coast of W. Australia, in 26° S., is called Freycinet Estuary; and a cape near the extreme S.W. of the same coast bears the explorer's name. In 1805 he returned to Paris, and was entrusted by the Gov. with the work of preparing maps and plans of the expedition; he also completed the narrative, and the whole work appeared under the title of *Voyage de découvertes aux terres Australes* (Paris), 1807-16.



FREYR

As God of the Sun he has the golden boar Gullinbursti lying at his feet

Freyr, in Norse mythology, the god of the earth's fruitfulness, the giver of sunshine and rain, and all the fruits of the earth, and thus the source of all prosperity, the son of Njord. He was especially worshipped in the temple at Upsala in Sweden.

Freytag, Georg Wilhelm Friedrich (1788-1861), a Ger. philologist, b.

at Lüneburg. In 1819 he was appointed Professor of Oriental languages at Bonn, a post he held until his death. He published *Darstellung der arabischen Verskunst*, a treatise on Arabic versification; *Hamasa carmina*; and *Arabum proverbialia*; but his fame rests chiefly upon his *Lexicon Arabico-Latinum*, an abridgment of which was published in 1837.

Freytag, Gustav (1816-95), a Ger. novelist and dramatist, b. at Kreuzburg in Silesia. Attended Gymnasium at Ols, then studied philology at universities of Breslau and Berlin. In 1836 he took his degree with a remarkable dissertation, *De Inuitis poëseos scenicæ apud Germanos*. In 1839 he settled at Breslau as privat-docent in Ger. language and literature, and devoted principal attention to writing for the stage. He achieved success with his comedy, *Die Brautfahrt, oder Kunz von der rosen*, in 1844. This was followed by a volume of unimportant poems, *In Breslau*, 1845, and the dramas *Die Valantine*, 1846, and *Graf Waldemar*, 1847. He attained a prominent position by his comedy *Die Journalisten*, 1853, one of the finest Ger. comedies of the nineteenth century. In 1847 he migrated to Berlin, and the next year he took over, with Julian Schmidt, the editorship of *Die Grenzboten*, a weekly journal which, founded in 1841, now became the leading organ of Ger. and Austrian Liberalism. F. helped to conduct it till 1861, and again from 1867 till 1870, when, for a short time, he edited the new periodical *Im neuen Reich*. His literary fame became universal in 1855, by the publication of his novel *Soll und Haben*. This was translated into almost all the languages of Europe. It was undoubtedly the best Ger. novel of its day. It was impressive by its sturdy realism, and it was in many parts very humorous. The main purpose of the novel was to show that the Ger. middle class was the soundest element of the nation. But it had a more directly patriotic intention, in the contrast which it draws between the homely virtues of the Teuton, the shiftlessness of the Pole, and the rapacity of the Jew. As a Silesian, F. has no love for his Slavonic neighbours, and being a native of a province which owed everything to Prussia, he was naturally an earnest champion of Prussian hegemony over Germany. His powerful advocacy of this idea in his *Grenzboten* gained for him the friendship of the Duke of Saxe-Coburg-Gotha, whose neighbour he had become on acquiring the estate of Siebleben near Gotha. At the

duke's request, F. was attached to the staff of the Crown Prince of Prussia in the campaign of 1870, and was present at the Battles of Wörth and Sedan. Before this he had published another novel, *Die verlorne Handschrift*, 1864, in which he endeavoured to do for Ger. university life what in *Soll und Haben* he had done for commercial life. The hero is a young Ger. professor, who is so wrapped up in his search for a manuscript by Tacitus that he is oblivious to an impending tragedy in his domestic life. This book was, however, not so successful as its predecessor. Between 1859 and 1867, F. published in five volumes *Bilder aus der Deutschen Vergangenheit*, a valuable work on popular lines, illustrating the history and manners of Germany. In 1872 he began a work with a similar patriotic purpose, *Die Ahnen*, a series of historical romances, in which he unfolds the history of a Ger. family from the earliest times to the middle of the nineteenth century. This series comprises the following novels, none of which, however, reaches the level of his earlier works: *Jago und Ingraban*, 1872; *Das Rest der Zaunkönige*, 1874; *Die Bruder vom deutschen Hause*, 1875; *Marcus König*, 1876; *Die Geschwister*, 1878; and *Aus einer kleinen Stadt*, 1880. Among F.'s other works may be noticed: *Die Technik des Dramas*, 1863; an excellent biography of the Baden statesman, Karl Mathy, 1869; an autobiography, *Erinnerungen aus meinem Leben*, 1887; his *Gesammelte Aufsätze*, chiefly reprinted from *Die Grenzboten*, 1888.

Friar (from Lat. *frater*), the Eng. name given to the members of the various mendicant religious orders, the chief of which were the Franciscans or Minors (Grey Fs.), the Dominicans or Preachers (Black Fs.), the Carmelites (White Fs.), and the Austin Fs. or Hermits. Besides these there were the Trinity Fs. or Red Fs., and the Crutched or Crossed Fs. The name has also been applied to individual members of the orders as a title, e.g. Friar Lawrence in *Romeo and Juliet*.

Friar's Balsam, **Wound Balsam**, or **Jesuit's Drops**, a compound tincture of benzoin which is prepared by macerating benzoin with storax, tolu, and aloes in rectified spirit. It is used in the preparation of soaps and washes, as a medicine, and as a protective coating for wounds.

Fribourg, **Freiburg**, or **Freyburg**, a Swiss canton, situated in the S.W. of the country, with a town of the same name. The surface is hilly, the highest point being 7858 ft., and the chief rivers are the Broie and the Sarine.

It is essentially an agricultural and pastoral canton, and is famous for its cheese (Gruyère) and cattle. Timber and peat are also important products, and there are manufactures of straw hats, watches, and chocolate at Broc. The town of F., on the R. Sarine, is about 20 m. from Bern, and is the capital of the canton. It is the seat of the Bishop of Lausanne, and manufactures ice, sewing-machines, and agricultural instruments. The principal building is the collegiate church of St. Nicholas, with a nave dating back to the thirteenth century, a fifteenth-century bell-tower 250 ft. high, and an organ with about 7900 pipes. Pop. (canton) 147,000, (town) 20,000.

Frick, **Henry Clay** (1849-1919), American coal magnate; b. Dec. 19, at W. Overton, Pa.; son of John W. Frick. At nineteen became book-keeper in his grandfather's flour-mill at Broad Ford, in the Connellsville coke region. Coking, then a new thing, engaged his attention. In 1871 he formed the firm of Frick and Co.; and during the panic of 1873 he began to acquire control of the property and plant of the district. By 1889 his firm were in possession of two-thirds; and he entered into alliance with Carnegie, so that these two became masters of the coal and steel markets. He was chairman of Carnegie Bros. 1889-92; and chairman of the board of managers of the Carnegie Steel Co. from 1892. President, and from 1897 chairman, of board of directors of H. C. Frick Coke Co.—the largest coke-producer in the world. During the Homestead strike of 1892 his life was attempted by Alex. Berkman, who shot and stabbed him several times. He d. in New York, Dec. 2.

Friction (from Lat. *fricare*, to rub), the resistance to motion occasioned by the fact of two bodies being in contact. More technically, it is defined as the tangential force which tends to prevent the sliding of one body over another. It is doubtful, however, whether F. should be called a force at all, as when one body rests on the horizontal surface of another there is no tendency to motion tangentially at all, and the resistance of F. becomes operative only when an attempt is made to slide the upper body over the lower. When the body simply rests on the horizontal surface, the forces acting are the weight of the body downwards and the reaction of the lower surface vertically upwards, which are sufficient to keep the body in equilibrium. When an attempt is made to push the body in any direction, the F. is in general exerted in a

direction opposite to that of the force applied. If both surfaces were perfectly smooth, by the laws of mechanics there should be no resistance to the gentlest force applied, and theoretically the body would move in the direction of the force indefinitely in a straight line, with the velocity induced by the application of the force. The laws of theoretical mechanics, however, pre-suppose ideal conditions. They neglect the resistance of the air and the various modes of attraction, physical, chemical, and electrical, that may exist between the two bodies. As a practical problem, the resistance due to F may be analysed in a number of ways. The greatest practical consideration is the nature of the contact of the two surfaces. However smooth these may appear to be, there will always be roughnesses imperceptible to our sense of touch. Certain points or areas of the one body will be more intimately in contact than others; these will have to be lifted over irregularities in the other surface; they may be broken off, or may themselves rupture the opposing surface. In other words, there will be a certain amount of wear caused by the movement, and the overcoming of the cohesion of the particles dissipates some of the energy. This is remedied by the greater smoothness resulting from the motion being repeated again and again, although the ideal condition is never obtained. Again, if smooth surfaces are placed in contact, the particles of the one body tend to adhere to those of the other with a force which increases enormously as the distance between them becomes infinitesimal. Therefore, if it were possible to have two dry surfaces so smooth as to meet at practically all points, the force required to produce a sliding motion might amount to that required for the rupture of the whole. Such intimate contact of dissimilar particles would also produce electrical phenomena which would tend to retard motion, though it remains to be seen whether such electrical attraction is ultimately dissimilar from the molecular attraction suggested in the foregoing. Such considerations as those quoted do not necessarily enter into any practical measures for the diminution of F , but they point to the fact that there is a limit to diminution of F , because as we approach the ideal of smoothness, so may we call other kinds of attraction into play which will more than neutralise our efforts. Devices for the establishment of perpetual motion are bound, therefore, to fail on account of F . Even the diurnal rotation of the earth is retarded

little by little through the F of the tides.

Diminution of Friction.—The question of F enters largely into the construction of any machine or combination of moving parts for the transference of force from one point to another. Where it is desired that two surfaces shall form a rigid whole for a certain period, the promotion of frictional resistance is aimed at; where it is desired that two adjacent surfaces shall have independent motion, the reduction of frictional resistance is aimed at. Examples of the former class are the wheels and rails in the case of locomotive engines, and the belt-transmission of power in stationary engines; in both cases sliding has to be avoided. Examples of the latter class are levers working on a fixed fulcrum and wheels revolving on a fixed axis: in these cases it is necessary that as much as possible of the energy put into the machine may be applied to the effective point without dissipation on the way. The promotion of resistance is effected in the case of locomotive engines by the pressure exerted by the weight of the engine, and, in the case of belt-gearing, by a sufficient tension in the belt. For diminishing F , the commonest expedient is lubrication. This consists essentially of coating the adjacent surfaces with oil, so that a film of oil always exists between the moving surfaces. The F is then reduced to fluid F , as theoretically the solid surfaces pass over a surface of liquid, or *vice versa*, as motion is relative. In a perfect fluid as defined in hydrodynamics there is perfect mobility of the particles, but every fluid possesses some degree of viscosity, and as the contact is between surfaces, the phenomenon of capillarity (*q.v.*) accounts for some amount of F . Efficient lubrication means the provision of a continuous film of oil, but this is practically unattainable. The oil has a tendency to be carried away, and the best lubricating arrangement is where a continuous supply is carried by the machinery to the surfaces requiring it. Where the load on machinery is comparatively light, F is reduced by the use of ball-bearings. This arrangement consists of a series of hard steel balls surrounding the axle and moving in a groove or race in the wheel. The advantage to be gained is that a rolling contact is established between bearing and wheel, the only sliding occurring between ball and ball. The ball-bearing should be well lubricated to minimise the friction due to this sliding contact, and provided the balls are hard and perfectly spherical, there should be little dissipation of energy.

Laws and Measurement of Friction.

—As has been suggested, the conditions determining *F*. are so various that an entirely accurate statement of the laws is impossible. By presupposing some uniformity of conditions, however, it has been possible to formulate laws and indicate methods of calculation which are of practical advantage in a large number of cases. In the first place, it is recognised that the conditions affecting *F*. are different in bodies commencing to move, from those in bodies whose relative motion has been established for some time. Let a body be placed upon a plane which can be tilted up. For some time the component of the weight acting down the inclined plane is not sufficient to overcome *F*., but when a certain angle is reached, the *F*. is overcome and the body slides. Experiments were carried out in this way by Coulomb in 1781 and Morin in 1830–34, with many pairs of substances, with the general result that the same limiting angle was obtained for the same pair of substances every time. Coulomb enunciated the following laws: (1) The limiting *F*. bears a constant ratio to the normal reaction, and this ratio depends only on the nature of the substances in contact; (2) so long as the normal reaction is constant, the limiting *F*. is independent of the size and shape of the surface of contact; (3) when the body is in motion, the *F*. called into play is independent of the velocity, and bears a constant ratio to the normal reaction, this ratio being slightly less than the ratio for the limiting *F*. before motion. The normal reaction is the pressure of the plane upon the body at right angles to the surface of contact. There are three forces being applied: *W*, the weight vertically downwards; *R*, the reaction perpendicular to the plane; and *F*, the friction up the plane. These forces are just in equilibrium at the limiting angle, and therefore, by the triangle of forces, $F = W \sin \alpha$ and $R = W \cos \alpha$, whence $\frac{F}{R} = \tan \alpha$. The ratio $\frac{F}{R}$ is called the coefficient of friction and is generally represented by the Gk. letter μ . The values of μ for many pairs of substances has been determined, and although they admit of variations, they are often practically useful. Some of Morin's results give as the value of μ the following: Dry wood on dry wood, .25 to .5; soaped wood on soaped wood, .2; metals on oak, .5 to .6; leather on oak, wet or dry, .27 to .35; dry metal on dry metal, .15 to .2; wet metal on wet metal, .3; occasionally greased smooth surfaces, .07 to .08; well greased surfaces, .03 to .05.

Friday (A.-S. *frige daeg*, being a translation of the Rom. name of this day, *dies veneris*), the sixth day of the week, and the Mohammedan Sabbath. It is regarded as a fast day throughout the year by both Eastern and Western Churches (unless Christmas Day occur on a *F*.) in memory of the Passion, which is commemorated annually on Good *F*. According to the Mohammedans, *F*. was the day Adam was created and received into paradise, the day on which he was expelled from it, the day on which he repented, and the day on which he died, and it will be the day of the Resurrection.

Frideswide, or **Fredeswitha**, **St.** (d. c. 735), the patroness of Oxford, the daughter of the ealdorman Dida. She refused marriage with a Mercian noble, Algar, choosing rather a religious life. She was canonised in 1481.

Fridolin, sometimes called **Tridolin** or **Trudelin**, a sixth century Irish saint and patron saint of Glarus in Switzerland. He established a church on Säckingen Is. in the Rhine, and is known as 'the first apostle to Allemannia.'

Friedberg: (1) A tn. of Germany in the grand-duchy of Hesse, 17 m. from Frankfurt. It has manufs. of sugar, gloves, leather, and photographic chemicals. Pop. 11,000. (2) A small tn. in Upper Bavaria, with an old castle, about 4 m. from Augsburg. Pop. 4000.

Friedland: (1) A tn. of Bohemia, Czechoslovakia, about 12 m. from Reichenberg. It is noted for its manufs. of woollen and linen cloth, but besides this has an old castle formerly owned by Wallenstein. Pop. 7000. (2) A tn. of Prussia on the Alle, 28 m. from Königsberg. It was the scene of the defeat of the allied Russians and Prussians by Napoleon in 1807. Pop. 3000.

Friedrich Wilhelm Victor August Ernst, last of the Crown Princes of Prussia and Princes Imperial of Germany, was b. May 6, 1882, in the Marble Palace, Potsdam; eldest son of him who became Kaiser Wilhelm II. He entered the cadet school at Plön, April 1896. In 1901 he matriculated at Bonn. In 1903 he visited S. and E. Europe. On June 6, 1905, he married Cecilie, Duchess of Mecklenburg (b. 1886), by whom he has had four sons and two daughters. In Jan. 1906 he was placed in command of the Leib-Eskadron of the Garde du Corps. From 1907 he studied at the Institute of Technology, Charlottenburg. He was frequently in England, and often conversed with Edward VII. In 1909 he travelled in India, visiting

Russia before his return to Germany, where he was then placed in command of the 1st Life Hussars at Langfuhr by Danzig. He joined in the condemnation of Bethmann-Hollweg's weakness concerning Agadir (1911); and he took the army side in the Zabern affair of Nov. 1913, whereupon the Kaiser deprived him of his command. He commanded the Fifth Army at the beginning of the Great War; and in Sept. 1915 was (at least nominally) in command of the forces attacking Verdun. At the conclusion of the War he fled to Holland, where he occupied the parsonage on the is. of Wieringen until Nov. 10, 1923. He resumed residence at his palace of Oels, Silesia, on the 13th; and, as he undertook not to meddle in politics, he was left there undisturbed. He published: *Aus meinem Jagdtagebuch*, 1912; *Erinnerungen des Kronprinzen Wilhelm*, 1922; *Ich suche die Wahrheit*, 1922; *Meine Erinnerungen aus Deutschlands Heldenkampf*, 1923.

Friedrichroda, a tn. and popular summer resort of Germany near Gotha in the Thuringian Forest. The ducal hunting seat of Reinhardsbrunn, built on the site of the Benedictine monastery (1085), is in the vicinity. Pop. 7000.

Friedrichsdorf, a tn. in the Prussian prov. of Hesse-Nassau, 3 m. N.E. of Homburg, on the slopes of the Taunus hills. Dye-works, tanneries, weaving, and tobacco are its chief industries. Founded by Huguenot refugees in 1687. Pop. 2000.

Friedrichshafen, a tn. of Württemberg, Germany, on the E. shore of Lake Constance. The town is a favourite tourist resort. It was formed by Frederick I., who amalgamated the former imperial town of Buchhorn and the village of Hofen. It has machine shops, boat-building yards, and manufactures leather, etc. N. of the station are the Zeppelin works, erected by public subscription in 1908. The ground-floor contains the Zeppelin museum, with exhibits showing airship development. In 1924 the LZ126 flew from here to America. She was transferred to the American Air Service in accordance with the Treaty of Versailles, and named the 'Los Angeles.' The Graf Zeppelin was constructed here in October 1928, flew to U.S.A., remaining aloft 112 hours. She carried 20 passengers, freight, mail and a crew of 40. Pop. 11,500.

Friedrichsruh, a vil. in the prov. of Schleswig-Holstein, Prussia, 15 m. from Hamburg. It contains the mausoleum of Prince Bismarck, who died in 1898.

Friendly Islands, or Tonga Islands, situated in the S. Pacific to the E.S.E. of Fiji, have an area of 390 sq. m. They were discovered by Tasman in 1643, and visited by Cook in 1777, who, on account of the disposition of the natives, called them the F. I. A British protectorate was proclaimed over the Tonga Islands in 1900. They are ruled by Queen Salote, who succeeded her father in 1918. There is a legislative assembly which meets annually. The kingdom consists of a group of three islands—Tongatabu, Haapai and Vavau, with several outlying islands. Part of the islands are of coral formation and part volcanic. There are two active volcanoes, and the islands are subject to frequent hurricanes. The climate is mild and healthy, malaria being unknown. The inhabitants are mostly converted to Christianity; they are provided with free education, medical attendance and dental treatment. The soil is very fertile, and the chief exports are copra, fungus, green fruit, kava, and candle-nuts, the total value of the exports per annum being about £225,344. Imports include drapery, flour, sugar, fish, timber and hardware. There is a wireless station, telephone and a monthly sailing service to New Zealand via Fiji and Samoa. Pop. 25,918.

Friendly Societies. Despite occasional periods of financial instability, through which some of the smaller societies have passed, the social utility accruing from the almost universal institution of F. S. cannot be doubted. The participation in mutual advantages, on as sound an actuarial basis as small contributions will allow, combines the best principles of economy and collectivism, and the recognition of these facts may be said to have induced the state, almost from the earliest days of F. S., to render them assistance, especially by way of relief from taxation or other public burdens, and, ultimately, to recognise their elements of permanent value by adopting them as an integral part of the great scheme of insurance of 1911. (See *Approved Societies*, under NATIONAL INSURANCE.)

Voluntary associations for such purposes as the maintenance of members in sickness, old age and poverty have existed even from early in the seventeenth century, and it is generally assumed that the genesis of the F. S. is to be sought in the burial club, an institution of a quasi-religious character. But the more complex organisations of to-day are by no means referable to any spontaneous creation, and are rather the outcome of a general social development. The

more concrete expression of their nature, purposes, and the different classes into which they may be divided, is due to legislative interference by way of regularisation and co-ordination.

Doubtless F. S. may be formed for almost any purpose of a philanthropic or charitable nature, but a more restricted classification of objects is to be gathered from the Consolidating Act of 1876, which enumerates the kinds of societies which may be registered as F. S. under the Act. The purposes of such societies as the Act specifically designates F. S. include the relief or maintenance of the members, their husbands, wives, children, or other relatives in sickness or other infirmity and old age; payment of burial expenses; insurance on birth of children; and relief in case of unemployment, shipwreck, or other circumstances of distress; endowment insurance and insurance against fire of tools or implements to any amount not exceeding £15. Other classes of societies regulated by the Act are: 'Cattle insurance societies,' formed for the purposes of insuring against the loss of domestic animals from disease or other cause; 'benevolent societies' for any benevolent or charitable purpose; 'working-men's clubs' to promote social intercourse, mental and moral improvement, and recreation; and 'specially authorised societies,' or societies whose purposes justify the extension to them by the Treasury of the provisions of the Act. Except in the case of cattle insurance societies, a member cannot be sued for his contribution. The report of the Royal Commission of 1870 divided registered F. S. into thirteen classes, and gave them a nomenclature which has not found statutory expression. But the division, though only popular, brings out the distinctive characteristics of the various kinds of societies. Affiliated societies, like the great Manchester Unity of Oddfellows, the Order of Druids (see under DRUIDS, ANCIENT ORDER OF), and the Order of Foresters (q.v.), are those consisting of one central body and a number of independent branches variously called 'lodges,' 'tents,' or 'divisions.' Most of the lodges in existence before 1875 are now registered, but a society having a fund under the control of a central body, to which every branch must contribute, may be registered as a single society. Perhaps a curious feature of affiliated orders is, that their members did, and do to a certain extent even now, surround their meetings with a halo of mystery, and rejoice in the possession of secrets (see FORESTERS, ANCIENT

ORDER OF; FREEMASONRY). 'Local town societies' are largely Jewish, e.g. the 'Bekhur Cholim' (Visitors of the Sick). One of their principal features is that the members may insure against confined mourning, a ceremonial which, while it lasts, precludes them from following their employment. 'Local village and country societies' comprise chiefly the small unregistered public-house clubs. Two other important classes are the 'collecting' and 'dividing' societies. The former, which were so named from the fact that contributions were paid to collectors who went from house to house, were strongly animadverted on by the Commission by reason of the undue proportion of expenses of management to the total contributions. They are societies whose membership is composed essentially of persons of the lower social strata, who from one cause or another are, or were, unable to check mismanagement by the collectors and other officers of the society. But as against this, the commissioners conceded that the benefits of life assurance were extended to a class of persons who could not have been prevailed upon to insure except by such personal canvassing. These societies, as above indicated, are dealt with in the Consolidating Act, the Collecting Societies and Industrial Assurance Companies Act, 1896. Under this Act members must be supplied with a copy of the rules and a printed policy for a sum not exceeding one penny each. Default in payment of a contribution is not to cause forfeiture or a lapsed policy until continued default for fourteen days after written notice to the member of the amount due. Collectors may not be members of the committee nor hold any other office in the Society or vote at meetings. Dividing Societies are those which levy somewhat higher average contributions, and every Christmas time divide or 'share out' the surplus remaining after payment of sick allowances during the year.

In 1928 there were 22,000 societies and branches (subject to Industrial Insurance Act of 1923); these had a total membership of 7,500,000 and funds £100,000,000. In addition, there are 155 Collecting Societies with a membership of 16,750,000 and £41,000,000 funds.

There have been a great number of Acts passed since the time the legislature first recognised and regulated F. S. In 1850 a Consolidating Act was passed and societies divided into 'certified' and 'registered' societies; the former being those that obtained from an actuary a certificate

to their proposed tables of payments and benefits, setting out the data of sickness and mortality upon which they were based, and the rate of interest assumed. This division was soon dropped, as but few certified societies were ever established. Fresh privileges were accorded to F. S. by an Act of 1855, which Act remained in force until the Consolidating Act of 1876, which embodied certain of the recommendations of the Royal Commission of 1870. The Act of 1876 was amended by numerous subsequent Acts, which were all ultimately consolidated in the Friendly Societies Act of 1896, and the Collecting Societies and Industrial Assurance Companies Act, 1896.

A F. S. must consist of at least seven members in order to be registered. The advantages of registry are: (1) Exemption from penalties under any of the provisions of the Unlawful Societies Act, 1744, and Seditious Meetings Act, 1817, so long as the business and meetings do not go outside the registered rules. The result is that a registered society may, but an unregistered society may not, require any unauthorised test or declaration from its members without incurring a penalty; (2) exemption from stamp duties; (3) power to obtain transfers of stock standing in the name of trustees by order of the chief registrar when the trustees are absent, dead, or otherwise incapable of making the transfer; (4) preferential rights over other creditors on the death or bankruptcy of officers of the society; (5) power to admit minors as members from the date of birth; (6) power to make loans to members or subscribe to the funds of any hospital, infirmary, charitable, or provident institution such sum as may be necessary to secure to members of the society or their families the benefits of such hospital or other institution; (7) power to invest in savings banks or with the National Debt Commissioners; (8) reduction of rates on death certificates; (9) officers of the society may be compelled to give security for the rendering of proper accounts and to account for and deliver up the property in their hands; and (10) power to proceed summarily against anyone misappropriating the society's property. Every registered society must have a registered office, appoint trustees, audit its accounts, send annual returns to the registrar, make a quinquennial valuation of its assets and liabilities, and keep copies of balance sheets and valuations hung up in a conspicuous place in its registered office. Under a registered society an

individual member's rights are better safeguarded than in the case of an unregistered society. He is entitled to inspect the books, have copies of the annual return, and a copy of the rules on payment of not more than one shilling. In a registered society the limitation of an individual member's benefits, whether he belong to one or more societies, is a gross sum of £300, not including bonuses, or an annuity of £52. Surplus contributions of members, after payment of any assurance money, may be accumulated at interest. A member of a registered friendly society (other than a benevolent society or working-men's club) may dispose of any sum not exceeding £100 payable on his death by nominating any person he chooses to whom the money shall be paid at his decease. A registered society may invest its funds in any of the funds in which trustees generally are authorised to invest, or in a savings bank, or the public funds, or in the purchase of land, or in any other non-personal security where expressly authorised by its rules.

A F. S. may be dissolved either voluntarily or compulsorily. In the former case, the consent of five-sixths *in value* of the members, including honorary members, and of all in receipt of any relief, annuity or benefit, is necessary, unless their claims are provided for. In the case of an insolvent society, one-fifth *in number* of the members may apply to the registrar for a compulsory dissolution, and the registrar may make an award to that effect if on investigation that seems the best course.

F. S. were classified under two headings by The Industrial Assurance Act of 1923, as Life Assurance Societies and Collecting Societies, and changes were made in the control of these bodies. The most important of these was the appointment of a Commissioner of F. S., in whom are vested very great powers of control, and against whose decision it is only possible to appeal to the High Courts. The Commissioner can demand to be satisfied on financial and other subjects, and may return or refuse to pass balance sheets and other accounts, and can dissolve a society that defaults or fails to carry out its legal obligations. He has also the power to exempt bodies from the requirements of the Acts and is the authority to settle disputes, thus taking the place previously held by the Board of Trade. The Acts of 1923 and 1924 slightly varied the existing law on the insurance of children by making the limit for which a child can be insured £5 up

to three years of age, £10 up to six years of age, and £15 up to 10 years of age, but this alteration was in view of the slightly changed purchasing power of money. The old principle was maintained that no child should be insured for a larger sum than the cost of a funeral. In this and subsequent Acts powers were given for insurance in cases where the decease of the insured person might involve a liability on the insurer. The Acts of 1923, 1924 and 1929 made it an offence to issue illegal Life Policies. Up till this change, premiums were frequently paid where there was no insurable interest, and thus money lost to the insurer. In the new Acts it was provided that such a policy, issued in error, was to have a value bearing relation to the amount that had been paid, and this amount could be claimed in cash or as a paid-up policy.

For the effect of the National Insurance scheme on the existing F. S., reference should be made to NATIONAL INSURANCE. There can be no doubt that members of F. S. benefited financially by the National Insurance Act, although in the course of previous legislation they were, on the whole, gradually adopting a more scientific financial policy. Actuarially speaking, the rates of contributions should be such that with proper management the funds are adequate to provide not only for sickness allowance, endowments, sums at death, or other benefits and payments, but also for a reserve fund. For a full expert statement of the actuarial principles essential to solvency, see *Observations on Oddfellow and Friendly Societies*, by F. G. P. Neison, which were published in pamphlet form in 1847, with the object of calling the attention of the members of the celebrated Manchester Unity of Oddfellows to the then perilous condition of their society's affairs. The pamphlet contains a great deal of valuable statistical information respecting sickness and mortality rates, while more recent information is to be found collected at the registrar's office. In most societies the rules provide for (a) contributions at a uniform rate for all ages, together with an entrance fee varying according to the age of the entrant; or (b) periodical contributions at a rate varying with the age at entry. There are F. S. in many of the British colonies, notably in Australia, where there is a branch of the Ancient Order of Druids (q.v.). Fraternal Societies, as they are called, are also common in the United States, but except in Germany and France the system does not prevail

to a great extent in foreign countries. In Germany there is a much greater degree of State interference in the management of societies than in England, and a stringent system of inspection.

Bibliography.—Pratt's *Friendly Societies*; Fuller, *Friendly Societies and Industrial and Provident Societies*; Neison, *Observations on Oddfellow and Friendly Societies*, 1847; J. H. Woodward's *Employees' Mutual Benefit Society*; F. B. Fuller's *The Law Relating to Friendly Societies*, 1926.

Friends, Society of (or Quakers), owes its rise to George Fox (1624-1691), a native of Leicestershire. Although he had but little education, he was possessed of keen intelligence and spiritual power, and of a per-



GEORGE FOX

sonality which won the affection of men and women of widely different sorts. In the demoralisation of English life caused by the Civil War he found little help in his search for 'a principle that would overcome temptation,' and though he had a profound knowledge of the Bible, and set his life in the way of its teaching, he sought for spiritual assurance more fundamental than any external authority could give. He was driven to take his stand on his own conviction of the voice of God speaking within, shining in its own light or carrying its own evidence, i.e. not infallibly guaranteed by something more certain than itself. Thus he valued the Scriptures because in the light of God he recognised for himself that they were good. The religious thought of the day, taking its ultimate stand on the Scriptures, saw in this an under-valuing of them. This

'Inner Light,' or 'that of God in every man' was by the Quaker regarded as the light of Christ, who had always been active in the hearts of men, and whose outward appearance was a more eminent manifestation of himself than any other. This light was in the heathen, who were almost universally thought of as bound for an everlasting hell, but the Quaker asserted that for them there was salvation if they were obedient to such light as they had. He also repudiated the widely held doctrine of predestination. In a time when extreme (often almost exclusive) stress was laid on correctness of doctrine, the Quaker, while not indifferent to this matter, put the emphasis on obedience to the Light, insisting that it was *this*, not 'notions,' that showed the way to God. Throughout his life Fox called on Friends so to bear themselves toward others in the way that was *most likely* to call forth the response of goodness to goodness, or, as he expressed it, 'answering that of God in everyone,' even, in fact especially, in those who were doing evil. To a remarkable degree Friends lived out the truth that they had seen, but their exposition of it often lacked clearness and consistency, inasmuch as they were entangled in the spirit of their time more than they realised. Nevertheless, although they might not have explicitly recognised the fact, it was from this central principle that their special 'testimonies' proceeded. The Quaker insistence on the unlawfulness of all war for the Christian is based not only on humanitarian grounds or even on passages of Scripture, but also on the conviction that more important than individual or national safety is the bringing of the evil mind to the light whereas war deepens and multiplies the wrong. The Quaker pacifist position is no mean-spirited yielding to evil, but is a way of standing up to it which has in it the possibility of changing the evil mind, perhaps even by reason of the suffering endured by those who take this way. The whole matter turns on the ultimate standard of value which is set up. In early days, when their meetings were broken up with violence and Friends themselves were taken to prison, they did not put up a fight, and women did not call on men to protect them, but men and women alike set themselves, sometimes successfully, by non-resisting endurance, to bring home to their persecutors a sense of their evil-doing. The walking in the light led to a high standard of truthfulness, so that Friends in courts of law and elsewhere refused to confirm their words by oath, inasmuch as an oath

lowers the value of ordinary speech. Not only did they quote Matt. v. 33-37 and James v. 12, but they also insisted that for a follower of Christ, the *Truth*, it was a lowering to attempt to confirm his word by something supposed to be more binding. 'People swear to the end they may speak truth: Christ would have them speak truth to the end they might not swear' (Penn). They were confirmed in their stand by seeing all about them the small regard for oaths paid by many who had solemnly taken them. This same principle led Quaker shopkeepers to break away from the custom of bargaining by asking for their goods a higher price than they intended to take. This they held to be insincere, but though their practice led to temporary loss of custom, the convenience of the fixed price was so obvious that it became the usual way of trading. In their worship Friends give free play to the leading of the Spirit, and without arrangement of a service they wait before God in silence, not meeting merely as separate individuals but trusting that the fellowship of living silence shared together will 'naturally and frequently excite the worshippers both men and women to pray to and praise God and stir up one another by mutual exhortation and instructions' (Barclay). The times of silence are times of worship equally with speech.

The kind of meeting just described is that which is held on Sunday morning; in many places the evening is mainly occupied with an address dealing with some aspect of Quaker thought or activity. The Quaker way of worship had been practised by the 'Seekers,' people whose needs were not met by any religious body and who were gathering by themselves in the way described. It was these in particular who were reached by the Quaker message, and whole companies of them came to Friends. Many of them had discarded the outward rites of Baptism and Holy Communion, and to this day Friends, not believing these to have been commanded as permanent ordinances for the Church, do not practise them. Nevertheless they lay great insistence on the reality which these rites are intended to convey or symbolise. A heightened conception of the Light of Christ in every man has always rendered Friends keenly sensitive to outward conditions which put special difficulty in the way of obedience to it. From their beginning they have taken thought for the poor, having, even early on, some insight into the economic causes of poverty. Over a long period they have followed in the track of wars, organising (from

their own people and from outside) measures of relief for civilian sufferers. This was done on a large scale after the Franco-Prussian war of 1870-1, and on a much larger scale during and after the Great War, 1914-18.

Early in the eighteenth century Friends officially condemned trading in slaves, and eventually they joined with Wesley, Wilberforce, and others in the movement for its abolition, which came about in 1807. In 1833 they won their campaign against slavery in the British dominions. In the eighteenth century, Woolman, Benezet, and others induced Friends in America to give up slave-holding.

Fox's first recorded success in gaining converts was at Manchester in 1647, but the beginning of a Quaker Church was in 1652, when some hundreds of 'Seekers' were 'convinced' by him at Preston Patrick near Kendal. After two years' activity in the north of England, an organised campaign in 1654 carried the message all over England and Wales. About this time Friends' meetings began to be held in Scotland and Ireland. The glowing ardour, sometimes injudiciously manifested, of the preachers, and certain mannerisms, drew on them the attacks of the mob, sometimes led by ministers of religion, to whom the Quaker testimony against a paid ministry and the payment of tithes was naturally displeasing. In 1650, Fox, when imprisoned at Derby on a charge of blasphemy, called upon Justice Bennett to tremble at the word of the Lord. The justice retorted by calling him 'Quaker,' a word that had already been used of a certain fanatic sect, and the name stuck to the newly formed body because of its appropriateness, inasmuch as in some of their meetings a wave of spiritual emotion would cause a trembling to go through the company. After the restoration of the Monarchy in 1660, the Conventicle Acts of 1664 and 1670 made illegal religious meetings of more than four persons (in addition to members of the family in whose house they met) held otherwise than in accord with the way of the Anglican Church. In many places other Nonconformists gave way before the storm, but according to the testimony of their enemies, Friends held out to the end, often meeting in the street in all weathers when their meeting-house was closed against them, many hundreds of men and women being taken to prison. The refusal, for reasons above given, to take the oath of allegiance brought down on many Friends long terms of imprisonment, their bare promise and their

statement that it was against their principles to be concerned in plots not being accepted. About 450 Friends died in prison or directly in consequence of imprisonment. It was shortly before 1670, when, by reason of the death or imprisonment of leaders, the cause of Quakerism was at a low ebb, that William Penn (*q.v.*) and Robert Barclay (*q.v.*) came to it, and by their worldly standing, their learning, and the depth of their spiritual life they powerfully reinforced it. The Toleration Act of 1689 gave liberty for Nonconformist worship. For the next 150 years Friends settled down into quietism, their 'testimonies' tending to become matters of ritual and tradition rather than of living conviction. They were marked off from the world by peculiarities of dress and speech, and they studiously secluded themselves from it except so far as they were mixed with it in business and as they answered the calls of philanthropy. Deservedly they gained a reputation for rigid honesty and for right living in general, but also for being almost a monastic sect not desirous of increase. In 1796 they opened the 'Retreat' at York, the first asylum in England, almost the first in the world, where the insane were treated with humanity and efforts made to cure them. From the beginning of the nineteenth century they promoted the cause of elementary education. The seclusion came to an end soon after the middle of that century, and from that time Friends have mixed in the world undistinguished in appearance from others. One result of this emergence was an interest in foreign missions and now (1931) Friends are working in India, China, Madagascar, Syria, and Pemba, in their own country they have had a keen sense of civic responsibility, and very many of them, in proportion to their numbers, have taken part in the public life of their communities. Excluding themselves for a large part of their history from art and music and various forms of literature, they have found recreation in natural history and science, and in these branches of knowledge and in medicine the Society has contributed to England a large number of eminent men. In philanthropic and commercial enterprise many of its members have been pioneers. Toward the end of the nineteenth century Friends were confronted with the new learning and thought of the time, and though for half a century they had leaned toward the 'evangelical' type of theology, the essential Quaker principle made it less difficult for them than for

many others to receive new Biblical and scientific knowledge. It became evident that in the absence of the regular minister they had suffered from lack of teaching, and in 1903 there was opened at Selly Oak, Birmingham, an institution, Woodbrooke, where, for longer or shorter periods, men and women, both Friends and others, may receive instruction in Biblical, international, economic and kindred subjects.

From its beginning the Quaker Church has needed an organisation; the present system is substantially the creation of Fox shortly before 1670. In the Preparative Meeting a single congregation deals with its own affairs; several Preparative Meetings form a Monthly Meeting, the executive body; among other business it admits members and records withdrawals, it appoints Elders and Overseers, whose functions will be stated later, it carries through arrangements for marriage in the Quaker way, whether the parties are Friends or not; several Monthly Meetings form a Quarterly Meeting, concerned with the affairs of Friends in one or more counties, and a union of Quarterly Meetings forms a Yearly Meeting, the legislative body for its area. London Y.M. comprises Great Britain; Dublin Y.M., Ireland; and there are others in America and elsewhere. Any Friend may attend any of these meetings, and, in any of which he or she is a member, may take part.

Each meeting is presided over by a man or woman (aided by an assistant) who acts as secretary, and is called the Clerk. Decisions are not arrived at by vote, but after discussion (free from noise of applause or dissent) the Clerk records what he considers to be the judgment of the meeting. If on important matters there is considerable difference of opinion, a time of quiet waiting or an adjournment almost always leads up to a conclusion which can be united in by most, if not by all.

The Meeting for Sufferings, established in 1675 to supply the needs of sufferers from persecution, is a representative assembly, meeting monthly in London. It is the executive body of the Y.M., and it also takes cognizance of the concerns of Friends for service in any part of the world; it is sensitive to the cry of suffering wherever heard, and it watches legislative and other movements which have special bearing on national and international righteousness.

Elders are appointed to care for the Ministry, giving advice in the way of restraint or encouragement as is required. Overseers are ap-

pointed to have a special care for the congregation, to know who are any way in need, who are making inquiries concerning Friends, who are needing counsel, to see to the education of children, etc.

The membership of London Yearly Meeting (1931) is about 20,000. This includes a number who are abroad and also children of members; there are, in addition, several thousand regular 'attenders' of meeting not yet in membership. The headquarters of London Y.M. is Friends House, Euston Road, London N.W. 1., opposite Euston station. The Irish headquarters is in Eustace St., Dublin.

The Society of F. in America

In 1656 Quakerism was taken to America by two women, and others followed, but the colonists, fearing them to be in league with witchcraft and the devil, subjected them to terrible persecution. Three men and a woman were hanged. Before long, however, Quakerism became a dominant influence in Pennsylvania and other colonies both in religious and political life. A period of quietism set in, as in England, and shortly before 1830 Elias Hicks of Long Island so far pressed the doctrine of the Inner Light as to result in a self-sufficient individualism independent of the Scriptures or other outward aid. He was opposed with unsympathetic rigidity and a secession ('Hicksite') resulted. Those who remained again divided, the extreme conservatives separating from the majority, who were moving toward an undenominational evangelical type of theology. Philadelphia stood apart, its position now being that of English and Irish Friends. Those from whom the conservatives parted are (with the exception of certain Fundamentalist Yearly Meetings) organised into the 'Five Years Meeting,' headquarters Richmond, Ind. With few exceptions (Baltimore and others) they have given up the Quaker way of worship and meet under pastors. They retain the Quaker organisation and (for the most part) the position concerning war and the outward sacraments. The different sections are moving toward a sympathetic understanding of one another.

Bibliography.—It is not possible to mention more than a very few of the numerous works that may be consulted. There are many 'Journals' and 'Lives' of Fox and of other Friends. Officially issued is the 'Book of Discipline,' in three parts, dated 1921, 1925 and 1931 respectively. The standard histories are *The Beginnings of Quakerism* and

The Second Period of Quakerism, Braithwaite; *The Later Period of Quakerism and The Quakers in the American Colonies*, Rufus M. Jones. Exposition of doctrine: *The Faith of a Quaker*, Graham; *What is Quakerism?* and other works, by Grubb; *The Faith and Practice of the Quakers* and other works by Rufus M. Jones; and the series of Swarthmore Lectures. The *Friend* (weekly) and other periodicals are issued, none of them officially.

Fries, Elias Magnus (1794-1878), a Swedish botanist, b. in Smaland. He was professor of botany at the University of Lund (1824), and professor of practical economy at Upsala (1834). In 1851 he was called to the chair of botany at Upsala, and was also appointed director of the botanical museum and garden there. He wrote: *Notitiae florae Suecicae*; *Observationes mycologicae*; *Flora Hollandica*; *Systema orbis vegetabilis*; *Elenchus fungorum Lichenographia Europaea*; *Summa vegetabilium Scandinaviae*; *Monographia Nyemenomycetum Suecicae*.

Fries, Jakob Friedrich (1773-1843), a Ger. philosopher, b. at Barby, Saxony. He was professor of philosophy and elementary mathematics at Heidelberg in 1806, and in 1816 was invited to fill the chair of theoretical philosophy at Jena, but was deprived of his professorship for participation in the democratic disturbances of 1819. He was, however, recalled in 1824 as professor of mathematics and physics, and while at Jena, wrote: *Handbuch der praktischen Philosophie*, 1817-32; *Handbuch der psychischen Anthropologie*, 1820-21; *Die mathematische Naturphilosophie*, 1822; *System der Metaphysik*, 1824; *Die Geschichte der Philosophie*, 1837-40. Besides these he wrote the important treatise, *Die neue oder anthropologische Kritik der Vernunft*, in which he attempted to give a new foundation of psychological analysis to the critical theory of Kant. He is a link between Kant's system and the so-called historical school.

Friesland, or Vriesland, a prov. of Holland, on the N.E. side of the Zuider Zee. The surface is flat, and the coasts are protected by dykes, much of the province being below sea-level. The chief industries are cattle-rearing and the making of cheese and butter, but on the clay lands agriculture is also extensively practised. Woollens, fine linen fabrics, and sail-cloth are manufactured, and peat is dug in the higher fen district. The principal towns are Leeuwarden, Sneek, Bolsward, Franeker, Dokkum, and Heerenveen. Pop. 401,400.

Friesland, East, see AURICH.

Frieze, in classical architecture that member of the entablature immediately above the architrave and below the cornice. It is decorated in various ways according to the style of the architecture. Its most notable feature in the Doric style is the series of *triglyphs*, features which project slightly from the regular face and which receive their name from the channels which run down them. The triglyphs are divided one from the other by spaces as wide as the height of the F., which are named *metopes*. These are often elaborately adorned with sculpture. The Ionic F. has no triglyphs and is but rarely adorned with sculpture, and this is true also of the later developed Corinthian order. In domestic architecture the name F. is given to the band of decoration which runs round the interior walls of a building immediately below the cornice.

Frigate Bird, or Man-of-War Bird (*Fregatus Aquila*), a marine bird belonging to the sub-order Steganopodes of the order Ciconiiformes, and a native of the tropics. Its colour is black, strongly tinged with brown, while the pouch is scarlet. It is a large bird, having a long tail and wings, and a long hooked beak. It is essentially a sea-bird, and only comes to land during the breeding season. Its chief food is fish, and it has a habit of seizing the prey which it has forced another bird to disgorge. The two species of this family *Fregatidae* are *F. Aquila* and *F. Minor*.

Frigga, see FREYJA.

Friilled Lizard, see CHLAMYDOSAUROS KINGI.

Fringillidae, see FINCH.

Friol, a com. in the prov. of Lugo, Spain. Pop. about 9000.

Frisches Haff, a lagoon of F. Prussia. It is almost entirely separated from the Baltic by the Frische Nehrung, a strip of land about 40 m. long, its only means of connection with that sea being at Pillan, at its north-eastern end. The Haff is nearly 60 m. long, and varies in width from 1 to 15 m.

Frisi, Paolo (1728-84), an Italian mathematician, was a native of Milan. At the age of fifteen he entered the Barnabite order, and in 1756 was appointed professor of mathematics at Pisa. In the year 1764 he received a similar appointment in Milan, and just after this time visited several of the countries of Europe. Among his works may be mentioned: *Disquisitio Mathematica*, 1751; *De Causa electricitatis dissertatio*, 1757; *Cosmographia physica et mathematica*, 1774, 1775.

Frisian Islands, a series of islands

situated in the North Sea and extending along the coasts of Holland and Belgium.

Frisians, a seafaring people of Teutonic stock, who in the first century of the Christian era inhabited the coast lands between the mouths of the Scheldt and the Ems. They were tributary to Drusus, and were made socii of the Roman people, but in A.D. 26 broke out into revolt. They were, however, again subject to Corbulo in 47, but shortly afterwards all Roman troops were withdrawn to the left bank of the Rhine. In 58 they made an unsuccessful attempt to secure lands between the Rhine and the Yssel, and in 70 took part in the campaign of Claudius Civilis. After this they disappear from history, for it is uncertain whether they took part in the conquest of Britain, but come again into prominence in the seventh century at the rise of the power of the Franks. These people attempted to Christianise the F., but met with small success until Wilfred of York landed, and it is significant that both he and Willibrord, who came to Frisia in 692, found no difficulty in conversing with the inhabitants. The struggle between the Franks and the F. lasted for about 200 years, and although the F. made a stand for their freedom, they were compelled to cede the district from the Scheldt to the Zuider Zee to Pippin of Heristal after an unsuccessful battle at Dorstadt in 689, and in 734 to acknowledge the supremacy of the Franks in the N., being finally subdued in 785 in the days of Charles the Great. They were again in revolt under William of Holland, emperor 1248, and although W. Friesland was subdued, the inhabitants to the E. of the Zuider Zee resisted all attempts to bring them to subjection, and the main body of the F. was still independent when the countship of Holland passed into the hands of Philip the Good of Burgundy. He laid claim to the whole country, but the people called on Frederick III. in 1457 to protect their rights, and they were acknowledged as dependents of the empire, but in 1498 Maximilian, Frederick's son, detached the province of Friesland from the empire and gave it as a fief to Albert of Saxony, and in 1523 it fell with the rest of the provinces of the Netherlands under the rule of the Emperor Charles. From 1579 to 1795 it was one of the constituent parts of the republic of the United Provinces, preserved its own dialect, and had a separate stadtholder, but in 1748 William IV. was made hereditary stadtholder of all the provinces, and his grandson,

in 1815, took the title of King of the Netherlands.

Frith, see **FIRTH**.

Frith (or **Fryth**), **John** (1503-33), an English Protestant, b. at Westersham in Kent, and was educated at Eton and Cambridge. Being invited by Wolsey he went to Oxford, and on account of his zealous support of Reformation principles he was imprisoned. He was, however, released, and he then retired to Marburg, where he collaborated with Tyndale in his literary work. On his return to England in 1532 he was condemned to death for heresy, and burnt at Smithfield. He wrote, among other works, *Disputation of Purgatorye*, 1531.

Frith, **William Powell** (1819-1909), an English artist, was a native of Aldfield, Yorkshire. He became a Royal Academician in 1853. His first attempts were subject pictures such as: 'Othello and Desdemona,' and 'Coming of Age in the Olden Time.' After 1853, however, he began portraying scenes characteristic of English crowds. The grouping in these pictures shows great dexterity, and the types of people that he depicted testify to his observation and sense of humour. Among the best of these works are: 'Derby Day,' (Tate Gallery), 'Life at the Seaside,' and 'The Railway Station.'

Frithiof's Saga, see **TEGNER**, **ESAIAS**.

Friuli, a dist. of Italy of about 3000 sq. m., comprising the prov. of Udine and the districts of Görz and Gradisca in Austria. In mediæval times F. was itself a duchy. Pop. 670,899.

Froben (or **Frobenius**), **Johannes** (c. 1460-1527), a Ger. printer, b. at Hammelburg in Bavaria. He was educated at the University of Basle, and in 1491 founded a printing office in that city and issued about 300 works, among which may be mentioned his *Neues Testament* in Gk., 1516, which was used by Luther for his translation, and his editions of St. Jerome, St. Cyprian, Tertullian, St. Ambrose, and Erasmus. Some of his texts are illustrated by Hans Holbein. It was largely owing to F. that Basle was the leading centre of the Ger. book trade in the sixteenth century.

Frobisher, **Sir Martin** (c. 1535-94), an Eng. navigator, b. in Yorkshire. He made his first voyage to Guinea in 1554, and in the following ten years went on yearly expeditions to the N. shores of Africa and the Levant. In 1576 he made his first voyage in search of a N.W. passage under the auspices of Ambrose Dudley, Earl of Warwick, reaching Frobisher Bay, and in the following year, as admiral of the Company of Cathay, sailed to the same region in

search of gold, and explored S. of Meta Incognita and Jackman's Sound, bringing home 200 tons of gold from Kodlun-arn. In 1578 he made his third voyage, and discovered a new strait and the upper part of Frobisher Bay, and in 1586 was vice-admiral in Drake's expedition to the W. Indies. He was in command of the *Triumph* fighting against the Spanish Armada, and led one of the four newly formed squadrons, and the same year was knighted and put in command of a squadron of six ships to sweep the Narrow Seas. In 1590 he was vice-admiral to Sir John Hawkins, and in 1592 captured a large Biscayan ship with a valuable cargo of iron, etc. In 1594 he took part in the expedition against the relief of Brest and Crozon, and received a wound from which he afterwards *d.* at Plymouth.

Froebel, Friedrich Wilhelm August (1782-1852), a Ger. educational reformer, *b.* at Oberweissbach. The neglect he experienced in his youth led to his anxiety to promote the happiness of children. His mother died in his infancy, and his father, a pastor who thought more of his flock than of his family, soon married again, and an uncle took F. and he was sent to school, where he passed for a dunce; but though not being taught by the masters he was learning in his own way. Though his half-brother was sent to the university, F. was apprenticed to a forester. In this position in the Thuringian forest, he applied himself to the study of nature. No training could have been better suited to strengthen his inborn tendency to mysticism. Unity of nature was the conception in him which dominated all others. With difficulty he got to the University of Jena, but his allowance was too small to support him, and his university career ended in an imprisonment of nine weeks for a debt of thirty shillings. He then began to learn farming, but was sent for when his father's health failed. In 1802, when he was twenty, his father died, and he was left to shift for himself. During the next few years he took up land-surveying, acted as accountant and private secretary, but all the time was conscious that he was meant to benefit humanity in some way, how he did not know. He realised in what way, however, whilst he was studying architecture in Frankfort-on-Main. Here he met the director of a model school, who had caught some of Pestalozzi's enthusiasm. This man saw that his real field was education, and he persuaded him to take a post in his model school. Later he retired from this post and educated

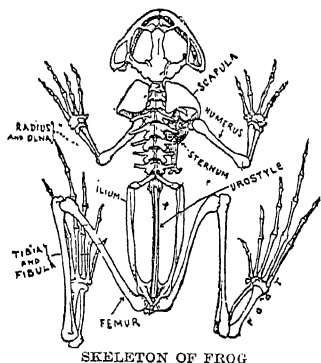
three lads in one family. He did not satisfy himself, and obtained the consent of the parents to his taking the boys to Yverdon, near Neuchâtel, and there forming with them a part of the celebrated institution of Pestalozzi. For two years he was qualifying to carry on the work begun by Pestalozzi. Taking the results at which he had arrived through the necessities of his position, F. developed the ideas involved in them, not by further experience but by deduction from the nature of man, and thus he attained to the conception of true human development, and to the requirements of true education. F. now determined to continue the university course interrupted eleven years before, but again he was stopped, this time by the King of Prussia's celebrated call to 'My people,' so he enlisted in Lützow's corps and went through the 1813 campaign, but his military duties did not take his mind off education. Through his patriotism he met Langelthal and Middendorff. These two young men became attached to him on the field, and were ever after his faithful followers. Later he opened a school, starting with his own orphaned nieces and nephews as pupils, and enlisting the services of his two friends, first one, and then the other, as teachers. Later still they all three married and formed an educational community. An educational institution was started by F. in Switzerland, but it proved a failure. The Swiss Gov., wishing to turn his presence to advantage, sent young teachers to him for instruction. He felt that till the school age was reached, children were neglected, and he schemed for small children a graduated course of exercises, modelled on the games in which he found them most interested. At Keilhau he opened the first kindergarten, in the near-by village of Blankenberg. This was in 1837. Self-activity was the keynote. The children were taught to do things; it was play, but as they played they learnt. See *Autobiography*; *Letters*; and *Life* by E. Shirreff.

Frog-hopper. Sub-section Cica-dellina, or the genus Cercopidae, ranked under the Homopterous sub-order of insects. The name F.-H. refers partly to the form of their body, partly to their great powers of leaping. The common F. is *Aphrophora spumaria*; another species frequently met with in gardens is *A. bifasciata*. The larva of these insects, which, except in the lack of wings, resembles the perfect insect in most respects, envelops itself in a froth resembling human

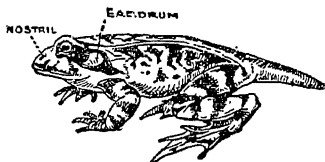
spittle. This is often observed on plants.

Frogmore, see WINDSOR CASTLE.

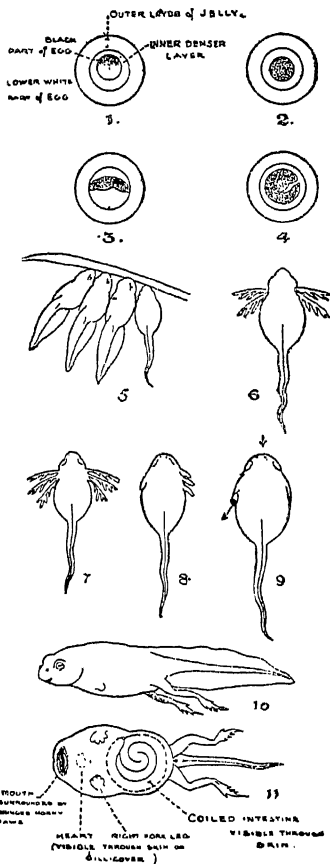
Frogs, the name applied to the family Ranidae of the Ecaudata order, but in common speech the term is loosely used to include other families of the Ecaudata order. The family Ranidae includes some 200 species. The differential characteristics of the



family are the presence of cylindrical, transverse processes on the sacral vertebrae, of teeth in the upper jaw, and the vomer, the fixation of the tongue in front instead of behind, more or less marked webbing between the toes, and a horizontal pupil in the eye. The best known varieties of F. are the British F. or *Rana temporaria*, the edible F. or *Rana*



esculenta, and the American bull-F. or *Rana catesbiana*. There are also many very remarkable members of the family. For instance in W. Africa there is found a hairy F., the *Trichobatrachus robustus*, on whose sides and hind limbs long villous outgrowths are seen. Most of the tree-F. are now known to be more nearly allied to toads than to F., but the *Rhacophorus* of E. Asia, called by Wallace the *lying frog*, is a true member of the family Ranidae. It has



1, A frog's egg; 2, egg at end of segmentation; 3, the elongation of egg during development; 4, the young tadpole coiled up in the jelly or albuminous layer just before hatching; 5, fresh hatched tadpoles clinging to a leaf of water plant; 6, tadpole with two pairs of external gills; 7, tadpole with three pairs of external gills; 8, seen from below, hence the animal's left is on the reader's right; the arrows in 9 mark the course of the respired water, viz. in at the mouth and out at the spout on the left side; 10, later stage of development—hind legs appear; 11, No. 10 seen from below.

markedly developed webs between the toes which it uses as parachutes in jumping from branch to branch. Other tree-F. make nests in the branches of trees which overhang water. The British F. hibernata in holes in the ground. In the early spring they come above ground and mate. At this season a horny cushion appears on the first finger of the male F. The eggs are laid in water, and are fertilised as they are laid. Nearly all F. desert their eggs, though there is one species in which the male places the eggs into hollows on the female's back, where they stay until they hatch out. The tadpoles hatch out from the eggs in about a fortnight. At first they are fish-like animals with external gills, and a long swimming tail, but no limbs. The first change to take place is the disappearance of the external gills, and the development of internal gills, which are still later supplanted by lungs. The hind legs appear before the front legs, and the last change to occur is the diminution and final disappearance of the tail. The tadpole stage lasts about three or four months. At the end of this time the animal leaves the water and lives in grass. Some species such as the edible F. are always aquatic. The grass F. lives mainly on insects, small worms, etc., which it catches very cleverly with its tongue. By autumn the F. grows big and sluggish. It stores fat in a special gland in the abdomen, and this fat is what it lives on during its winter sleep.

Frog-spit, or Cuckoo-spit, *see* FROG-HOPPER.

Frohman, Charles (1860-1915), American theatrical manager, *b.* in Sandusky, Ohio. From 1879 he was assistant manager of the Madison Square Theatre, New York. In this country he was known by his touring companies. Perished in wreck of the 'Lusitania,' torpedoed off Irish coast May 7.

Frohschammer, Jakob (1821-93), a Ger. theologian and philosopher, *b.* at Illkofen, near Regensburg. Intended by his parents for Rom. Catholic priesthood, he went to Munich to study theology, but felt a growing interest in philosophy. In 1847 he became a priest. His logical intellect would not allow him to yield the Church unquestioning obedience. After openly defying the Bishop of Regensburg, he obtained permission to continue his studies at Munich. In 1850 he published his *Beiträge zur Kirchengeschichte*, which was placed on the 'Index Expurgatorius.' In 1855 he became Professor of Philosophy. He went on publishing controversial works which gave offence

to his ecclesiastical superiors. He was denounced by the Pope, and students were forbidden to attend his lectures. He was, however, accorded a public ovation, and the king gave him his support. In 1862 he founded the *Athenäum* as the organ of Liberal Catholicism. In 1871 he was excommunicated. His system is based on the unifying principle of imagination, which he extends to the objective creative force of nature, as well as to the subjective mental phenomena to which the term is usually confined.

Froissart, Jean (1338-1410), Fr. historian, chronicler, and raconteur. His own verses and chronicles tell the story of his life. He was curé of the village of Lestines, but there are no memories of him there; he made no mark on the inhabitants. No one can point to any house in Valenciennes, and say that he once lived in it. Even the time and place of his death are not certain, nor do we know his burial-place. St. Monegunda of Chimay claims to hold his bones. His forefathers were aldermen of Beaumont, near the R. Sambre, to the W. of the forest of Ardennes. His father was a painter of armorial bearings. There is nothing to show that Jean Froissart was, as a boy, unlike other boys. He loved games of dexterity and skill, rather than sedentary amusements such as chess and draughts. All the splendour of mediæval life was to be seen in his native city. Knights and soldiers, priests and artisans, crowded the streets. The churches were rich with stained glass, and the libraries were full of wonderfully illuminated manuscripts. There were festivals, masques, mummeries, and moralities. It was a time of plenty in which he lived. Quite early he loved a demoiselle. He remarked the beauty of her blue eyes, and became provided with that essential for knight, soldier, or poet, a mistress, one for whom he could write verses, but the lady was cold and the poet was sad. Not till the day he was leaving his native city did she grant him an interview. The conclusion of his only love adventure is simply told in his *Trekkie de l'espinnette Amoureuse*. The progress of the amour was rudely interrupted by calumny, and this led to a complete rupture. Queen Philippa made him her secretary, and later, King John of France made him his. He is said to have *d.* in great poverty. His poetry was mechanical and monotonous, but his *Chronicle* is universally admitted to be a great work.

Frome, a market tn. in Somersetshire, 107 m. from London and 24½ m. from Bristol. It contains a fourteenth-century church, a market-hall,

museum, school of art, and a free grammar school, founded under Edward VI. There are breweries, foundries, wire-card manufactories, and edge-tool works. The woollen trade, formerly the principal industry, is declining. Pop. 10,000.

Fromentin, Eugène (1820-76), a Fr. painter and writer. After leaving school he studied under Louis Cabat, the landscape painter. He visited Algeria whilst young, and the land afterwards suggested subjects for pictures. His works were not more artistic results than contributions to ethnological science. His first great success was produced at the Salon in 1847 by the 'Gorges de la Chiffa.' He was much influenced in style by Eugène Delacroix. His works were noted for striking composition, dexterity of handling, and brilliancy of colouring. His later work shows signs of an exhausted vein caused by physical enfeeblement. His writing showed another side of his genius. He wrote less than he painted, but he expressed himself more really in literature than in painting. *Dominiqne*, published in 1862, is remarkable among the fiction of that century. His most important pictures are: 'La place de la brèche à Constantine,' 'Enterrement Maure,' 'Bateleurs Nègres,' 'Audience chez un chليفة,' 'Berger Kabyle'; and among his books the most noted are: *Visites Artistiques*; *Simplex Pèlerinages*; and *Les Maîtres d'autrefois*. In 1876 he was an unsuccessful candidate for the Academy.

Fronde (1648-52), the name given to a civil war in France, and also to its sequel, a war with Spain (1653-59). The word means 'a sling,' and it was used to describe this contest, because the windows of Cardinal Mazarin's followers were pelted with stones by the mob in Paris. Originally the object was the redress of grievances, but there was a factional contest between the nobles and Mazarin, the former attempting to reverse the results of Richelieu's work and to overthrow Mazarin, his successor. In May 1648, a tax levied on judicial officers of the parlement of Paris was met by that body not merely with a refusal to pay but also with a condemnation of earlier financial edicts, and even with a demand for the acceptance of a scheme of constitutional reforms, framed by a committee of the parlement. This charter was influenced by contemporary events in England, but there is no real likeness between the two revolutions, the French parlement being no more representative of the people than the Inns of Court were in England.

Frontenac, Louis de Buade, Comte de (1620-98), a French colonial officer, entered the army in 1635 and soon rose to be brigadier. He was appointed governor of the French possessions in N. America in 1672, but owing to frequent quarrels with the Jesuits was recalled in 1682. He was, however, sent out again when war broke out with England in 1689, and it was then that, having repulsed a British attack on Quebec, he so broke the power of the Iroquois that they were never again a terror to the colony.

Frontinus, Sextus Julius, a Roman writer and soldier, was praetor in A.D. 70. He was governor of Britain in 75, and while holding that office distinguished himself by the conquest of the Silures. In 97 he was nominated *curator aquarum*, and died about 106. He wrote *Strategematon Libri IV.*, a book on the art of war, and *De Aqueductibus Urbis Romæ Libri II.*, which contains a history and description of the water-supply of Rome, and other matters of importance in the history of architecture.

Fronto, Marcus Cornelius (c. A.D. 100-170), Roman historian, was b. in Numidia. He came to Rome in the reign of Hadrian, became very famous as an orator, and was made tutor to Marcus Aurelius and Lucius Verus. Few only of his works are extant, and these fall far short of the writer's great reputation. A number of his letters, addressed chiefly to Antoninus Pius, Marcus Aurelius, and Lucius Verus, were published at Rome in 1823.

Frosinone, a tn. of Italy in the prov. of Rome, 32 m. from Gaeta. Pop. (commune) 12,000.

Frost, that condition of climate when the temperature of the air is below the freezing-point of water; the term is also applied to manifestations in the form of small crystals of ice. Under ordinary conditions of pressure pure water solidifies at 0° C. or 32° F. Water containing substances in solution freezes at temperatures somewhat below this point. Water contracts as it cools down to 4° C., but below that point it expands for a decrease in temperature, and as it solidifies in a crystalline form, it takes up more space as a solid than as a liquid. Therefore, water-pipes are likely to burst during a F., though the subsequent leakage is not discovered until the thaw, or period when the temperature has again risen above 0° C. The expansion of freezing water is also responsible for breaking off large pieces of rock when water has collected in cracks, and for the general disintegrating effects of F. upon soil and even vegetable struc-

tures. The general condition determining F. is diminution of temperature below 32° F., but in the British Isles this does not obtain as an average condition, even through January, the coldest month of the year. There are, therefore, usually special circumstances connected with Fs. After the sun has set, the earth gradually loses heat by radiation from its surface. Radiation is hampered by an abundance of water-vapour in the atmosphere, therefore Fs. occur on clear nights when there is neither cloud nor wind. These conditions are characteristic of anticyclonic periods, that is, when there is a high barometric pressure and the air gently flows outwards from the anticyclonic area. Anticyclones are associated with warm sunny days even in winter, and with clear frosty nights even in summer. As the likelihood of F. depends upon the freedom of the atmosphere from water-vapour, some indication of the probable night temperature may be gained from an examination of a wet- and dry-bulb thermometer; a good estimate is obtained by multiplying the difference between the wet- and dry-bulb readings by 2½, and subtracting the result from the actual air temperature (dry bulb). Sometimes the frequency of Fs. is affected by the nature of the land with regard to slope. On a calm night, the heavier cold air tends to flow down the sides of hills to the valleys below, therefore plantations on the slopes of hills are not so liable to F. as those in the valleys. The effects of F. on agricultural enterprise may be advantageous, or the reverse, according to the seasonableness of the low temperature. Thus a F. in winter helps to break up the ground and checks the growth of plants at a time when too early development might be dangerous. On the other hand, spring Fs. often do great damage by destroying blossoms and fruit buds. The destructive action of F. on vegetation is due to the formation of ice on the outside of the cells, from which the water has been squeezed by the contraction due to low temperature: if the ice thaws rapidly, the water cannot be reabsorbed by the cells in time, and either runs off and causes the plant to dry up, or collects in intercellular spaces and causes decay. As Fs. do not often occur in our climate when the air is humid, attempts are sometimes made to prevent a threatened F. by flooding the soil. This causes a bank of mist to rise up and serve as a blanket for the prevention of overmuch radiation. A bank of smoke has the same effect; therefore it is the custom to light fires in such posi-

tions that the smoke will drift over threatened orchards, etc. Small areas may be sufficiently protected from a light F. by coverings of straw, paper, etc.

Frostburg, a tn. in Maryland, U.S.A., in the co. of Alleghany. It is a popular summer resort, and lies in the midst of the coal region of the state. It has foundries and manufs. fire-bricks, and is the seat of a state normal school. Pop. 5588.

Frost Figures, or **Ice-flowers**, the curved aggregations of ice-crystals, produced when hoar-frost is formed on a cold surface. The atmosphere contains a varying amount of water-vapour diffused in it. The amount of water-vapour depends on the physical configuration of a country, the prevailing winds, nearness to the sea, etc., and the capacity of the air for holding gaseous water increases with its temperature and pressure. When no more evaporation is possible, the air is said to be saturated, and any decrease in temperature when this condition is established causes the deposition of the excess of water on any available surface. When the condensation of water-vapour occurs high in the atmosphere, the water is deposited around a dust-particle as nucleus; when it occurs at the surface of the earth, the water is deposited on the ground in the form of dew. Should the temperature drop to below 32° F. the water-vapour may be deposited as ice without passing through the intermediate liquid stage. In these circumstances small crystals of ice are formed, belonging to the hexagonal system of crystals. They have the habit of twinning; that is, two crystals may have a common face, but their axes may not be parallel. This phenomenon, when continued with crystal after crystal, produces a pattern of gradual curves, whose interpenetration and divagation produce a remarkable similarity to beautiful foliage.

Frost, Robert, one of the best living American poets, b. at San Francisco, March 26, 1875. His parents, who were of New England stock, returned to their home section, and F. was educated at Amherst College and Harvard. He worked his own little farm at Derby, New Hampshire, 1900-05, and taught English at the local academy from 1905 to 1911. He then taught psychology from 1911 to 1912 at the New Hampshire State Normal School, and since 1916 has been Professor of English at Amherst College. F. has identified himself completely with New England, its way of speech, and the slow tragedy of the farmers of the old native stock, who find it increasingly

hard to make a living on their rocky farms. He is not only a devotee of New England colloquialism and New England colour, but he is also a stern realist in his poems. Here is no pretty-pretty romance, but the everyday life of the plain people, related often in a free verse that he has made a perfect instrument for his thought. He himself claims kinship with Emerson. But Emerson in his poems often celebrated the flora of New England. F. sings of the human beings—their isolation on their little farms, the weight of the long winters, the tasks to be done, the pessimism and madness that often come. His work was crowned one year by winning the Pulitzer prize for American poetry. His best volumes are *North of Boston*, 1914; *Mountain Interval*, 1916, and *New Hampshire*, 1923. In 1931 he issued a collected edition of all his verse.

Froth Fly, see FROG-HOPPER.

Froude, James Anthony (1818-94), historian, was educated at Westminster and Oriel College, Oxford. After a distinguished career at the university, he devoted himself to the composition of his *History of England from the Fall of Wolsey to the Defeat of the Spanish Armada* (1856-70). This was his greatest work, and brought him much renown; but, though most admirably written, as a history it is not to be relied upon, F. being inclined rather to endeavour to support his own theories than to follow the facts elucidated by the documents from which he worked. Among his other books were: *The English in Ireland in the Eighteenth Century*, 1872-74; *Oceana*, 1886; *The English in the West Indies*, 1888; *The Life and Letters of Erasmus*, 1894; and *English Seamen in the Sixteenth Century*, 1895. A friend of Carlyle from 1849, the Scotchman appointed him his sole literary executor, and in that capacity he published Carlyle's *Reminiscences*, 1881; *Letters and Memorials of Jane Welsh Carlyle*, 1883; *History of the First Forty Years of Carlyle's Life*, 1882; and *Carlyle's Life in London*, 1884. His biography of Carlyle was vigorously attacked, and gave rise to a controversy, which was revived some years ago. F. was editor of *Fraser's Magazine* from 1860 for fourteen years. He was rector of St. Andrews from 1868, and regius professor of modern history at Oxford, 1892-94. There is a biography by Herbert Paul, 1905.

Fructidor (fruit-month), the twelfth month in the Fr. calendar inaugurated at the time of the Revolution. The period extended from Aug. 18 to Sept. 16. The 18th F. of the year

V. (Sept. 4, 1797) is celebrated as a day in which the republic was saved from the machinations of the royalists.

Fructose, or Fruit Sugar, a carbohydrate of the formula $C_6H_{12}O_6$, which occurs in sweet fruits, honey, and starches together with dextrose. It is also obtained by hydrolysing sucrose with sulphuric acid. It can be obtained as a syrup, as a crystalline powder, or as a granular crystalline, and is readily soluble in water and in dilute alcohol. It is sweeter than cane sugar, and is more easily assimilated.

Frugoni, Carlo Innocenzio Maria (1692-1768), Italian poet, b. at Genoa. At the age of fifteen he was sent to a monastery, and, though the act was repugnant to him, made to take monastic vows. In 1716 he was professor of rhetoric at Brescia, and afterwards taught at Rome, Genoa, Bologna, and Modena. He became poet laureate to the Duke of Parma, and was released from his monastic vows by the Pope. His lyrics and pastorals are remarkable for their facility and elegance, and he was also a very successful writer of Latin poetical epistles, and of Italian poems in the style of Ariosto.

Fruit, in the popular acceptance of the term, is a word of uncertain significance. In ordinary phraseology a plum, a strawberry, or an apple is called a F., whilst a pea-pod or a poppy-head is not so designated. When the structure of these plants is examined it is found that the latter are as true Fs. as the former. Botanically a F. may be defined as the fertilised gynaecium of a flower, together with those other adherent parts that become enlarged after fertilisation. Strictly speaking 'true fruits' consist solely of gynaeceal structures, those in which other substances are involved being more or less 'pseudocarps' or false Fs. The entire structure of a F. as distinguished from the seeds which it encloses is called the 'pericarp'; this consists of three layers, distinguishable in a greater or less degree in different Fs. These layers are called the outer epidermis or 'epicarp', the inner epidermis or 'endocarp', and between them a spongy mesophyll or 'mesocarp.' In pseudocarps the other structures contributing to the F. are mainly derived from the floral receptacle. In the strawberry the carpels, which form the apocarpous polycarpellary gynaecium, are scattered in numbers over a fleshy outgrowth from the conical white receptacle. In the apple the true F. is the core; in the cucumber the fibrovascular bundles of the carpellary

leaves form a ring near the inner surface of the fleshy portion. The terms pericarp, epicarp, mesocarp, and endocarp cannot be properly applied to the whole of the pseudocarpic structures. Fs. have been variously classified, and a great variety of names applied to the different forms; these, however, do not as a rule come within the scope of a scientific classification. The following classification is simple, though not free from objection, as succulence has undoubtedly originated independently in many different groups.

Dry Dehiscent Fruit.—In this class the F. 'dehiscens' or splits either into one-seeded portions or cocci, which do not themselves split, so as to discharge its seeds. Most capsules split with a valvular dehiscence, the side walls (pericarp) splitting in a longitudinal direction, and coming away in segments known as valves. If this splitting takes place down the dorsal sutures it is called 'loculicidal dehiscence'; if down the ventral suture, 'septicidal dehiscence.' With either of these modes of dehiscence the septa may be broken across in such a manner as to leave the seeds as a free central column on the placenta; this is termed 'septifragal dehiscence.' Some dehiscent Fs., as those of the balsams and geraniums, split so as to throw their seed for some distance. Other capsules dehisce by teeth, the carpels splitting slightly at the apex, as in the cowslip (*primula veris*), dianthus, etc. The legume splits down both sutures; the follicle down one only. In the pimpernel (*Anagallis*) the top of the capsule comes off as a round lid.

Dry Indehiscent Fruit.—Fleshy Fs. are mainly indehiscent. The nut has a tough and leathery pericarp in the oak, chestnut, and beech, and a woody one in the hazel. An achene is a dry indehiscent one-seeded carpel; the caryopsis is the characteristic F. of grasses. The cypsel is the characteristic F. of the order Compositæ, and differs from achene in being syncarpous. The bicarpellary F. of the Umbellifere is an inferior schizocarp.

Succulent Fruit.—The two main varieties of succulent F. are the 'berry' and the 'drupe' or stone fruit. The characteristic of the former class is the succulence of the whole pericarp. To this belong the gooseberry, the grape, the currant, etc. The drupe is indehiscent, and its pericarp is generally divisible into three layers, the epicarp, the mesocarp, the endocarp (*vide supra*). The latter, which forms the 'stone,' is densely sclerenchymatous, and encloses the kernel. Stone Fs. are

chiefly grown for their mesocarp; the almond is an exception, as in it the seed is of more value than the mesocarp. A knowledge of the flower and the process of fertilisation is necessary for the understanding of any F. See FLOWER, FERTILISATION, and BOTANY.

Fruit, Drying of, see FRUIT, PRESERVATION OF.

Fruit, Preservation of. If not carefully treated, many fruits will decompose rapidly when attacked by bacteria, moulds, or yeasts, and the problem of their preservation is how to protect them from these. On the other hand, fruits such as winter pears and apples can not only be preserved for a long time without injury, but require keeping in order to bring them to a perfect condition. A fruit-room should be cool and shady, and at the same time dry and airy; damp and stagnant air, and sunshine, are alike to be avoided. The fruits should be gathered before they are absolutely ripe, handled very carefully, and laid out without being in contact with each other if possible. Periodically, they should be examined, and those which show the least symptoms of decay should be removed. As regards other fruit, the method of drying dates, figs, and raisins has been known from early times, but in recent years considerable progress has been made in the systems employed. Apples, pears, plums, apricots, cherries, and strawberries, as well as a number of vegetables, can be, and are in great quantities, dried with perfect success. In Great Britain the supply of fresh fruit is so good all the year round that the demand for the dried fruit at a price which represents a fair profit to British growers is uncertain, yet the Admiralty and the War Office buy large quantities, and at some seasons of the year grocers make a great feature of these products. Apples, after peeling and coring, are dried whole, sliced or cut into rings after being soaked in briny water to prevent them turning brown. They take from seven to eighteen hours at a temperature of about 200° F. to dry. Pears are first steamed, and dry in about eight hours. Apricots, after stoning, dry in twelve hours in a rather higher temperature. Cherries dry in five hours in about 140°, and plums require about 200° and about fifteen hours' drying. After drying the fruit is exposed to the air for about a week, and then, if still in good condition, keeps well, however stored. The drying is done in specially constructed stoves by air which enters under the furnace and is distributed upwards through trays of wire netting



SOME TYPICAL FRUITS

1. Cypsela—Head of *Olearia Haastii* in seed. 2. Cypsela—Single parachute seed of

on which the fruit rests. The cold-storage system for preserving fruits for a short period has resulted in a great increase in our imports of fresh fruits. The art of bottling fruit has long been familiar to housewives, but only in recent years have its commercial possibilities been realised. The apparatus required is very simple and inexpensive. Fruit slightly under-ripe is placed in glass bottles having air-tight caps and filled up to the neck with pure water. The whole is then heated by water or steam for a given time at a given temperature, the top being screwed down or otherwise fixed immediately afterwards. Sterilisation need not be complete in this process, as the presence of organic acids and the small amount of nitrogenous matter prevent development of the organisms of decay, and bottled fruit has been found to last in perfect condition for many years. The boiler or steriliser may be any vessel, from a saucepan or fish kettle to a specially constructed steam steriliser, and while small quantities of fruit can be bottled at no more expense than that of the fruit and the bottles and the firing, a relatively small outlay would be sufficient to provide a complete outfit with which very considerable quantities of fruit might profitably be treated. Any fruit, whole or sliced, may be bottled. Plums, gooseberries, cherries, raspberries, loganberries, and currants are most commonly preserved by this method, but apricots, peaches, rhubarb, apples, pears, limes, and lemons, as well as asparagus and other choice vegetables, can be sterilised and satisfactorily kept for out-of-season use.

Fruit-bat, the name given to all members of the Pteropodidæ, a frugivorous family found only in the tropical regions of the East and in Australia; they are variously called flying foxes, flying-bats, and fox-bats. The heads of many of them are

curiously fox-like, and their hair is a reddish brown. *Pteropus edulis*, the great kalong, is the largest of all bats, measuring nearly 5 ft. across the wings. *Cynopterus marginatus* is the destructive and voracious Indian F.

Fruit-farming, as distinct from market-gardening, comprises the cultivation of tree and bush fruit, including strawberries and raspberries. The agricultural conditions, etc., are treated under the headings of the different fruits; a short account of the extent of F. in this country, and of the importation of fruit will here be given. The growing popularity of the fruit industry may be gathered from the fact that the Board of Agriculture returns concerning the fruit areas of Great Britain show a continuous increase. The total area in 1888 was 199,178 acs., in 1901 234,660 acs., and in 1930, 322,425 acs. The following table shows the areas devoted to F. in 1930, excluding small fruit areas:—

County	Acres
Kent	60,687
Devonshire	21,951
Herefordshire	19,826
Somersetshire	19,227
Worcestershire	22,306
Gloucestershire	14,223
Norfolk	9,368
Sussex	5,290
Cambridgeshire	5,756
Isle of Ely	5,131
Essex	4,820
Lincolnshire	4,191
Cornwall	4,123
Suffolk	3,539
Middlesex	3,428
Salop	3,086

The acreage under small fruit cultivation is about one-fifth of that devoted to F. The principal small fruits grown are strawberries, cur-

- same. 3. Glans or Nut—Sweet Chestnut, cupule open, showing the three nuts. 4. Glans—Longitudinal section of nut of same. 5. Glans—A single nut of same. 6. Glans—Section of young fruit. 7. Capsule of *Euonymus Europæus*. 8. Capsule of same, open and empty. 9. Capsule of same, open, with seeds in position. 10. Samara—Single samara of Elm. 11. Samara—Single samara of Ash. 12. Samara—Double samara of Sycamore. 13. Samara—Section of half of same, showing enclosed cotyledonous leaves. 14. Legume—Pod of Broom, closed. 15. Legume—Pod of Broom, open. 16. Berry—Wild Gooseberry. 17. Berry—Section of same (transverse). 18. Carcerulus—Fruit of *Phlomis fruticosa*, with part of calyx-tube. 19. Carcerulus—Fruit of *Phlomis fruticosa*, splitting into four nuts or achenes. 20. Drupe—Cherry. 21. Drupe—Section of same, showing stone. 22. Drupe—Complete section of same, showing kernel within stone. 23. Pome—Crab-apple. 24. Pome—Transverse section of same. 25. Pome—Longitudinal section of same. 26. Ætaerio of Follicles—*Magnolia conspicua*. 27. Ætaerio of Follicles—Vertical section of same. 28. Ætaerio of Drupes—Blackberry. 29. Ætaerio of Drupes—Vertical section of same. 30. Cynarrhodium—Dog-rose. 31. Cynarrhodium—Vertical section of same. 32. Strobilus—Spruce Fir, closed cone. 33. Strobilus—Spruce Fir, winged seeds of same, within scale. 34. Strobilus—Weymouth Pine, open cone.

rants, gooseberries and raspberries, while loganberries are rapidly increasing in importance. Among the principal strawberry-growing counties are Cambridgeshire, Hampshire, Norfolk, and Worcestershire. The following table shows the proportion occupied by the various small fruits in 1930 :—

	Acres
Strawberries .	21,527
Raspberries .	6,559
Currants and Gooseberries	33,945
Other kinds .	4,178

The figures show that there was a net increase over 1929 of 1573 acs. in the small fruit areas.

The following table shows the average crop per ac. of some of the fruits :—

Strawberries .	16.5 cwt.
Raspberries .	22.3 „
Red Currants .	20.6 „
Black Currants .	19.4 „
Gooseberries .	46.1 „

Filberts and cobnuts have the disadvantage that they will not bear for four or five years, and do not reach their maximum bearing capacity for eight years. F. is an uncertain industry, and a moderate crop in a bad year will probably yield more profit than a good crop in a very good year, when the market will consequently be glutted. A large amount of labour is required, but in some cases the profits have been compensated for this. It is, however, in the cultivation of fruit, principally grapes and tomatoes, under glass, that the largest fortunes have been made. About 12 tons of grapes and 20 tons of tomatoes may be grown to the acre by this method. Owing to the perishable nature of the produce, few industries are more precarious in this respect, and great developments are possible in the direction of systematic marketing in the interest of the producer. Experiments have been tried with considerable success along co-operative lines, the growers in a district (as in the Pershore district of Worcestershire) combining to form a market of their own from which supplies can be forwarded with the minimum of delay and expense to places where the demand is good. Another development which would considerably enhance the profitable character of F. and diminish its risks would be the provision of factories and other facilities for preserving the surplus produce by one or other of

the various methods outlined above (FRUIT, PRESERVATION OF).

The great proportion of fruit grown in the British Isles is produced as a side line on farms and in market gardens, and failing a highly elaborated system of marketing, within easy distance of a fruit farm, and failing also a specially well suited climate and soil, this is undoubtedly the best method of undertaking fruit culture. The grower is then not seriously dependent on the vagaries of the season, and can usually make good use of a considerable part of the land occupied by the fruit crops, as by pasturing sheep in the orchard, or by enclosing it in a series of poultry runs.

Fruit-farming in the U.S.A.—The growing, marketing and also canning and preserving of fruit in the U.S.A. has attained enormous proportions. Vast areas have been opened to fruit growing by extensive irrigation projects. The sale of fresh fruits has been steadily increased by the railways developing rapid transmission of special refrigerated cars from the fruit districts to the big cities. Thus in the late winter and early spring freight cars are run from the south to the north at the speed of passenger trains and melons and canteloupes are distributed in the same manner. Over 260,000 acres of land are devoted to the growing of strawberries, raspberries, loganberries, blackberries, cranberries and currants. The total crop averages well over 400 million quarts, valued at over 60 million dollars. The crop of orchard fruits—apples, peaches, pears, plums, cherries and apricots—averages over a quarter million bushels, valued at about 450 million dollars. The development in the growth of sub-tropical fruits—oranges, lemons, grapefruit and figs—has been so great as to close the American market very largely to imported fruits. The value of this crop is estimated at over 120 million dollars. The industry of canning fruits for the autumn and winter seasons has grown so big that the product is valued at over 100 million dollars per annum.

Importation of Fruit.—F. is carried on extensively in all the dominions and in many colonies, and in foreign countries. By the process of canning, and by the use of refrigerating chambers on board ships, fruit can now be transported to any part of the world. The importation of fruits has increased of late years contemporaneously with the increase in home-grown produce. The following table gives figures for the years 1893 and 1929 :—

Fruit	Value of Imports 1923	Value of Imports 1929	Principal Countries from which imported
Apples . .	£843,500	£7,029,027	America, Australia, Tasmania.
Bananas . .	549,000 (1900)	5,646,412	Columbia, Canary Islands, Jamaica.
Grapes . .	530,500	2,017,711	Channel Islands, Algeria, California, France, Spain (the chief exporters), etc.
Plums . .	331,600	1,043,243	America, S. Africa, Continent, etc.
Oranges and Lemons .	1,703,700	11,228,541	Mediterranean, Spain, Florida, Palestine, etc.

See the articles on the various fruits, and GARDENING; also the report of a committee of the Board of Agriculture and Fisheries on the fruit industry of Great Britain, and Bulletin on Fruit Production, and the *Journal of the Royal Agricultural Society*, vols. xiv.-xxv. (2nd series); C. Whitehead, *Fruit-farming*, 1904; and the periodical reports of the Empire Marketing Board, especially the report issued in May 1931, which gives a survey of the whole import trade both from the empire and from foreign countries.

Frumentius, St. (c. A.D. 300-360), an apostle of Ethiopia, *b.* in Phœnicia. He was captured by the Abyssinians, whom he converted to Christianity, and he was consecrated Bishop of Axum about 336. He is said to have translated the Scriptures into Geez.

Fruntsberg, Georg von (1473-1528), the great leader of the Ger. Landsknechts (free-lances) during the Italian wars of Maximilian and Charles V., was *b.* at Mindelheim in Swabia. He fought for Maximilian against the Swiss in 1499, and in 1504 took part in the war in the Netherlands. In 1509 he won fame in the war against Venice, and in 1513 and 1514 was again occupied with the Fr. and Venetians. He gained a victory at Bicocca in Italy in 1522, and was partly responsible for the defeat of the Fr. at Pavia, 1525, and suppressed a peasant revolt in Germany the same year.

Frunze, tn. in Asiatic Russia, formerly called Pishpek. Cap. of the autonomous Kirghiz republic. It is in Semirycchensk, 150 m. S. of S.W. extremity of Lake Balkhash. Grain is cultivated and there are tobacco factories.

Frunze, Mikhail Vassilievich (1885-1925), Russian revolutionary general, *b.* at Pishpek (re-named Frunze, 1926), son of a peasant settled in Turkestan and become surgeon. Sent to Siberia 1914; but escaped, and again heard of at Minsk, 1917. Beat Koltchak, 1919; fought Wrangel successfully, 1920. In 1924, President

of the Revolutionary Military Council. In Jan. 1925, became people's commissary for military and naval affairs. Died in Moscow, Oct. 31.

Frustum, a portion cut off from any solid figure. The term is most frequently applied in the case of the cone, and conoidal surfaces of revolution. By 'frustum of a cone' is meant any part cut off from a cone which does not contain the vertex. This distinction is drawn because any part of a cone which contains the vertex is still a cone.

Fry, Charles Burgess (b. 1872), an Eng. athlete and journalist, graduated from Wadham College, Oxford; has played in international football and cricket matches; is founder and editor of *Fry's Magazine*, and published *Cricket* in 1912. Hon. director of the naval training ship 'Mercury.' He captained England's team in test matches, 1912.

Fry, Sir Edward (1827-1918), an Eng. judge, *b.* at Bristol. He was educated at University College, London, and London University, and was called to the Bar in 1854. He was made a Q.C. in 1869, and in 1877 was raised to the bench and knighted. From 1877 to 1883 he was judge of the High Court Chancery Division, and in 1883 was made Lord Justice of Appeal, but resigned in 1892. He presided over the Royal Commission in the Irish Land Acts, 1897-98, and was conciliator in the S. Wales colliery dispute, 1898. He was chairman of the Court of Arbitration under the Metropolis Water Act, 1902; arbitrator between the London and North-Western Railway Company and their employees, 1908; and ambassador-extraordinary and first British plenipotentiary to The Hague Peace Conference in 1907. He was made G.C.B. in 1907. He wrote *Essays on the Accordance of Christianity with Nature of Man*; *The Doctrine of Election*; *James Hack Tuke*; *Studies by the Way*; *The Liverworts*, 1911.

Fry, Elizabeth (1780-1845), a prison reformer, the wife of Joseph F., was

a daughter of John Gurney, the Quaker banker of Norwich. She devoted her life to endeavouring to alleviate the condition of those who suffered imprisonment. The conditions, especially in the women's prisons, were early in the nineteenth century only to be described as terrible, and it was mainly due to her efforts, which were as persistent as they were whole-hearted, that the matter became one of practical politics, and thus, being dragged into the light, was made the subject of inquiry, and ultimately improved. There are biographies by her daughter, Mrs. Cresswell (1845), and by Susanna Corder (1853).

Fry, J. S., & Sons, cocoa and chocolate makers, and members of an Eng. Quaker family. *Joseph Fry* (1728-87) was the founder of the firm at Bristol. He was also interested in type-founding and soap-boiling, and had chemical works at Battersea. In 1795 a larger factory was built, and in 1798 a Watt's steam engine was in use. The control of the firm afterwards passed into the hands of *Francis Fry* (1803-08), and it was he who was largely responsible for the great development of the business. He also took a prominent part in the introduction of railways in the W. of England. In 1896 the business was converted into a limited company.

Fryatt, Charles Algernon (1872-1916), Eng. master-mariner; was *b.* Dec. 2, 1872, at Parkeston, Essex. In 1904 he was chief officer in the Great Eastern Railway's Harwich-Rotterdam steamship service; in 1913, captain. When the submarine policy of the Ger. Gov. came into force Feb. 18, 1915, it became F.'s constant business to cross a war-zone where his ship was liable to be sunk without warning. On the afternoon of Sunday, March 28, 1915, when navigating the ss. *Brussels* from Parkeston to Rotterdam, he was met by submarine *U33* near the Maas lightship. He disregarded the signal to stop, and steered for the submarine, which escaped by diving. The Gers. afterwards stated that he had allowed the *U33* to approach for inspection. On the night of June 23-24, 1916, steaming home from the Hook of Holland, the *Brussels* was captured by a torpedo-boat flotilla and taken to Zeebrugge. F. was tried (for his alleged offence of March 28, 1915) at Bruges, July 27, 1916, and shot the same day. His widow received a special pension; and his body was brought home to Dovercourt, July 7, 1919.

Fryxell, Anders (1795-1881), a Swedish historian, *b.* at Hesselkog, Dalsland, Sweden. He was edu-

cated at Upsala and ordained in 1820. In 1821 he was made Doctor of Philosophy at the University of Upsala, and in 1840 was elected a member of the Swedish Academy. His chief work is *Berättelser ur Svenska Historien*, a history of Sweden from the earliest times to the death of Gustavus III., which took forty-six years to complete. He also published a *Swedish Grammar*, the first systematic one in the language, *Conspiracies of the Swedish Aristocracy*, and a book on *The Literature of Sweden*. F.'s histories were very popular in his own day, owing to the picturesqueness of his style and to the fact that he was essentially a national writer; but he was not always exact, and because of this his works threaten to become obsolete.

Fuad I. (Ahmed Fuad), King of Egypt; *b.* March 26, 1868, in the palace of Gizeh; youngest son of Khedive Ismail Pasha. After his father's fall, went to Italy; studied at military academy and artillery school at Turin. On return to Egypt, married May 30, 1896, Princess Shivekar (*b.* in Constantinople)—they had one daughter and were divorced. In 1917, on death of his elder brother, Sultan Hussain Kiamil, F. became sultan; and, the British protectorate coming to an end, he was proclaimed king March 16, 1922. Married May 25, 1919, Princess Nazli—they have one son and three daughters. In 1927 he visited European capitals. In 1928 the constitution was suspended—restored 1929, in which year the King was in England and a treaty with that country was signed.

Fuad Pasha, Mehemed (1814-69), a Turkish statesman, *b.* at Constantinople. He entered the Civil Service about 1836, and became secretary of the embassy in London. In 1851 he was made Minister of Foreign Affairs (a post he held three or four times during his life), and in 1861 was appointed Grand Vizier. He commanded the troops on the Gk. frontier during the Crimean War, and also accompanied the Sultan Abd-ul-Aziz on his journey to Egypt and Europe. He ably managed the foreign affairs of Turkey, and was remarkable for his bravery and promptness of decision, as well as for his wit.

Fuca, Juan de, Strait of, connects Paget Sound with the Pacific Ocean, and separates Vancouver Is. on the N. from the state of Washington on the S. It is about 90 m. long and 13 m. broad, and contains several islands, one of which, San Juan, was awarded to the U.S.A. in 1872.

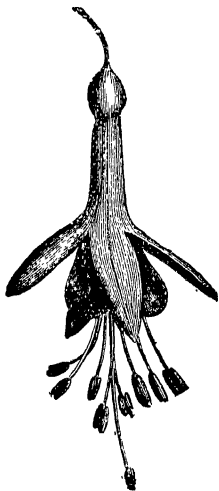
Fu-chau-fu: (1) A city in China,

cap. of the prov. of Kiangsi, an important seat of trade in native paper. (2) A city in Fu-kien, China, *see* FOCHAU.

Fuchow (Foochow), a tn. of Manchuria in the prov. of Liaotung on the E. shore of the gulf of that name, S. by W. of Newchwang.

Fuchs, Leonhard (1501-66), a noted Ger. botanist, b. at Membdigen, Bavaria. He studied classics at Ingolstadt under Reuchlin, and became Professor of Medicine at Tübingen in 1535. Soon after he took up the pursuit of botany, of which he must be looked upon as one of the fathers. His most important work on the subject is *De Historia Stirpium Commentarii Insignes*, 1545. This work is beautifully illustrated, and gives a clever description of domestic plants alphabetically arranged. In it F. laid the foundation of a permanent botanical nomenclature. The fuchsia was named after him.

Fuchsia (Neo-Lat., named after Leonhard Fuchs, a genus of plants of the natural order Onagraceæ, contain-



FUCHSIA

ing more than fifty known species, mostly natives of tropical America. The majority are shrubs, but some are acaulescent or climbing. The flowers are generally pendulous, four-petaled and of a brilliant and delicate colouring, red, purple, and white. The leaves are opposite and verticillate. Fs. are much cultivated as green-

house plants, and a certain small-growing variety is a common outdoor plant, which flourishes over a wide area in the British Isles where the climate is not too vigorous.

Fuchsin, an aniline dyestuff of a magenta or red colour, consisting of a mixture of the hydrochlorides or acetates of pararosaniline and rosaniline. In commerce, F. is known by various names, such as magenta, aniline, rubine, roseine, etc., and it is widely used for dyeing purpose. Occasionally it is also employed for the colouring of confectionery and wines.

Fucino, Lake of (Lat. *Lacus Fucinus*), a lake bed of the Abruzzi, Italy, in the province of Aquila. The level of the lake was subject to great variations, owing to lack of an outlet, and disastrous consequences were frequently the result of this. It was 37 m. round and 65 ft. deep. In A.D. 37 the Emperor Claudius constructed a tunnel $3\frac{1}{2}$ m. long by which the surplus waters were carried to the Liris. It is uncertain when it finally went out of use, but various attempts were made to re-open it from 1240 onwards. In 1876 the lake was finally drained and the bed is now cultivated.

Fuegians, the aborigines of Tierra del Fuego. They are divided into three distinct groups, viz. the Onas, the Yahgans, and the Alacalufs, in the E., centre, and W. of Tierra del Fuego, respectively. The Yahgans are the true aborigines, closely allied to the primitive long-headed races of the New World. Very little is known of the Alacalufs, but they are probably of Araucanian descent. The Onas are similar to the Tehuelche Patagonians in their tall stature and the nomadic life they lead. The F. have dark brown, copper-coloured skins, and plentiful black coarse hair, their heads being particularly developed. They hunt and fish to supply themselves with food, and live in huts formed of tree-trunks and branches. They obey no chief, and do not appear to believe in a future life, though they are afraid of invisible beings and spirits.

Fuego, Tierra del, *see* TIERRA DEL FUEGO.

Fuelling Stations. The wide commercial interests of Great Britain have long made it essential that ample stocks of fuel should be stored at convenient ports along the chief routes to the Far East and Australia, for the service of the Royal Navy and the Mercantile Marine. As long ago as 1873 a Royal Commission was appointed to deal with the whole subject, and on the basis of this Commission's report in 1881 adequate arrangements were made for the

provision of suitable stations, especially for the service of ships travelling to and returning from the Far East. In 1889 the widening of the Suez Canal was completed, and the old journey around the Cape became no longer necessary, and, in consequence, additional ports had to be provided which involved new arrangements at Port Said, Suez and Aden. As a great deal of anxiety was expressed concerning the unprotected nature of these fuelling stations in time of war, a Naval Defence Act was passed in 1889, under which powers were granted for the provision of protection from attack by sea. Further uneasiness arose on the development of aircraft during the Great War, and latterly efforts have been concentrated on giving protection to these stations against aerial attack. In the old days fuelling stations were practically coal stores, established at convenient points, but of recent years the substitution of oil for coal, as a fuel, has proceeded at a great rate, so that these ports have become chiefly oil depôts. This in turn has had its effect upon the Mercantile Marine, in which tankers have been taking the place of colliers to a remarkable extent. There are estimated to be 1800 vessels now entirely devoted to carrying oil, nine-tenths of which are themselves oil steamers. The substitution of oil for coal has resulted in new economic difficulties. Under the old conditions, Great Britain, in maintaining this huge system of F. S. throughout the world, built up an enormous export trade for the coal of Wales and Durham. This business is now greatly reduced owing to the substitution of oil, more than four-fifths of the world's supply of which is exported by the American continent.

Fuels may be described as carbonaceous materials which give rise to the phenomenon of heat in combining with oxygen. The carbon and hydrogen which are contained in the F. unite with the oxygen of the air to produce a greater or less amount of heat, according to the properties of the F. and the manner in which it is burnt. The amount of heat which a F. gives out during combustion naturally has a great influence on its value for commercial purposes, and this will be considered in detail. With regard to their origin, F. may be divided into three classes: natural, prepared, and liquid and gaseous F. To the first class belong wood, peat, lignite, and all kinds of coal; to the second belong compressed F., such as briquettes, etc., prepared peat and wood, charcoal, and coke; in the third class are found petroleum and

its extracts, alcohol and certain hydrocarbons, such as benzol and naphthalene, coal gas, natural gas, and producer gas. From the point of view of composition, the F. in the first two classes above fall into the category of solid F., liquid F. form a second class, and gaseous F. a third. The selection of a F. for a given purpose is guided by considerations of economy, suitability, and convenience. The combustible portions of all F. consist of one or more of the following ingredients: free carbon, free hydrogen, and carbon combined with one or more of the elements hydrogen, oxygen, and nitrogen. The heating or calorific power of a fuel is the quantity of heat generated by the combustion of a unit weight. The heat is measured in units; the standard unit now adopted in this country is called the British Thermal Unit (B.Th.U.), and is the quantity of heat required to raise 1 lb. of water by 1° F. when at its maximum density, i.e. from 39.1° to 40.1° F. The scientific unit of thermal value is the caloric, which is the amount of heat required to raise a unit weight of water (at 39.1°) 1° C. Heat may be stated in calories or B.Th.U. for comparative and calculating purposes, but to engineers the evaporative duty of the coal is of the most importance, and this is usually stated as so many pounds of water at 100° C. (212° F.) converted into steam at the same temperature. In the case of town gas, to facilitate calculation, the 'therm' was introduced by the Gas Regulation Act. One therm is equivalent to 100,000 B.Th.U.'s. An important point with F. is the quantity of inorganic matter they contain, as this constitutes the ash, the amount of which is an important factor in the suitability and economy of the F. In addition to the F. enumerated above, various kinds of vegetable refuse, such as brushwood, straw, cotton, stalks, etc., are used for heating purposes where better F. is lacking. In various parts of France and Germany tan cakes made of the spent bark used by tanners are employed as F. A common F. in India and Egypt is the dung of camels and oxen, which is moulded into thin cakes and dried in the sun; these have very little calorific power, and are characterised by an acrid ammoniacal vapour during combustion. The salient characteristics of the various F. are briefly as follows:—

Wood.—The value of wood as a F. varies with the amount of moisture therein and the ash which remains after combustion. Even after prolonged drying, wood will contain

from 17 to 20 per cent. of moisture. The percentage of moisture in a few varieties of fresh-cut wood is as follows: Hornbeam, 18·6; sycamore, 27; oak, 34·7; pine, 39·7; elm, 44·5; larch, 48·6; poplar, 51·8. The percentage of ash in wood is on the average between 2 and 3. The calorific power of wood is low, as much heat is required to consume the moisture, and the percentage of hydrogen is very low. The charcoal which is made from wood has about a quarter of the weight of the wood used, and double the calorific power of an equal weight of wood.

Peat is formed of vegetable matter, such as mosses and aquatic plants, which, by the agency of pressure, have in time become converted to the spongy brownish-black substance which is found in peat bogs. When cut out in square blocks and air-dried in the usual manner, its calorific power is roughly equal to that of wood. When the peat is excavated and compressed into briquettes by machinery, however, a really valuable F. is produced which will bear comparison with the best coal. Peat represents an intermediate formation between wood and coal.

Coal may be classified into three main varieties: Lignite, bituminous, and anthracite. Lignite or brown coal is the least carbonised of any coal, showing indications of organised structure, and containing a considerable proportion of hydrogen and oxygen. Lignites burn with a long smoky flame, and contain from 60 to 75 per cent. of carbon. Their calorific power varies from 3500 to 5000 calories, and their evaporative power from 2·16 to 5·84. Most of the coals found in this country are bituminous in character; there is a larger variety in this class of coal, which includes steam coals, coke and furnace coals, gas coals, and household coals. The coals which are most used for the house and general use are non-caking long-flame coals. They are found in abundance in Derbyshire, Staffordshire, Notts., and Scotland, and give a clean fire with little ash. From 70 to 80 per cent. of carbon is contained in them, but little available hydrogen; their specific gravity is about 1·25. The coals which are most used for the manufacture of gas contain from 80 to 85 per cent. of carbon, with a specific gravity of about 1·3. 'Cannel' coals, so called because their flame resembles that of a candle, are also very suitable for making gas. They differ in structure from ordinary bituminous coals, being closer and more compact. Coking and furnace coals burn with a smoky flame of varying luminosity, and contain in

some cases nearly one-third of volatile hydrocarbons. They form a very good coke, varying in weight from 50 to 80 per cent. of the weight of the coal used. Their specific gravity is from 1·2 to 1·25, and percentage of carbon 85 to 91. The best steam coals are anthracitic in character, being difficult to ignite and without much tendency to smoke. The specific gravity varies from 1·34 to 1·44, and the percentage of carbon from 90 to 93. Anthracite coals are hard and dense in character, with a metallic lustre; they represent a further stage of mineralisation than bituminous coals, though as in some coal fields the bituminous formation gradually gives way to anthracitic, no certain conclusion can be drawn as to their respective ages. Intense heat without flame or smoke is generated by anthracite, but as a powerful draught is required and ignition is difficult it is chiefly used in furnaces and engineering works. The specific gravity of anthracite varies from 1·4 to 1·6, and the percentage of carbon is as high as 98.

Coke has been prepared from coal for many years, but it was not until 1800 that the preparation of coke was carried out on scientific principles, great improvements being effected. For many metallurgical processes coke is specially prepared in coke ovens from well-washed small coal. The chief requisites of a good coke are strength, infusibility, a low percentage of sulphur, and a high calorific power. The percentage of coke yielded by the various coals varies somewhat: Durham coal yields 62·7; S. Wales coal, 72·6; Derbyshire coal, 59·32; and Lancashire coal, 60·22 per cent. of coke. The constituents of a first-class coke should be, 92·98 per cent. carbon, 5·22 per cent. ash, 1·3 per cent. oxygen, ·27 per cent. sulphur, and ·23 per cent. nitrogen. According to theoretical calculations coke should be slightly more efficient from a heating point of view than coal, but in actual practice the results are about equal. There are certain varieties of coal which can be used most economically, for firing boilers, furnaces and kilns, when in a powdered form. As a result, pulverised fuel has developed considerably of late. Moisture and ash content, and friability of the fuel are the most important considerations when selecting the fuel. The fuel particles should not be more than $\frac{1}{16}$ in. diameter.

Liquid Fuel.—The use of liquid Fs. may be said to date from the middle of the nineteenth century. Of late years their use has greatly extended for steam raising and small furnaces,

as well as for internal combustion engines. The Eng., Ger., Fr., Italian, and American navies now all use liquid F. as an auxiliary to coal; the reason that it is used only as an adjunct is largely because the supply is not sufficient to enable it to be exclusively employed. The various petroleum distillates and residues represent the chief source of liquid F.; alcohol is also used, but to a less extent. The lighter extracts of petroleum, such as petrol, are well suited for high speed internal combustion engines such as are used in motor-cars, whilst the heavier residues are suited for producing heat for other engines, etc. At the present time Russia and America supply most of the petroleum of the world, but oil has been found in many other places. Most F. oils have about 85 per cent. of carbon, from 10 to 13 per cent. of hydrogen, and the remainder of oxygen, etc. Weight for weight the heating power of petroleum is about one-third greater than that of good coal. The following table gives some particulars about the chief varieties of oil fuel (reproduced by permission of Messrs. Constable & Co., from *Liquid and Gaseous Fuels*, V. B. Lewes, 1907):—

spray which is so finely divided as to act almost as a gas, thus ensuring complete combustion. This pulverising or atomising action is carried out either for forcing the oil out from a jet at a considerable pressure, or by injecting it with steam, or air, or a combination of the two. The Korting injector is a good type of the first method. The oil, at a temperature of 130° C., is forced into the injector at a temperature of 50 lb. to the sq. in. When inside the injector, the oil flows into a chamber feeding the jet, which is fitted with a spindle carrying a spiral screw. The oil is forced down this screw, and acquires a centrifugal action which sprays it in an exceedingly fine condition. In the Swensson injector the oil is forced out in a jet on to the point of a V-shaped metal cutter, which divides it into very fine spray. In the second class of injectors the usual method is that the oil is led down into the injector by the force of gravity and there meets a steam jet which drives it out from the nozzle of the injector with a high velocity and in a fine state of division. The out-rush of steam and oil is usually allowed to suck in the air around the jet to aid in the combustion. Among the best known types of this class of

	Specific Gravity	Flash Point	Calorific Power B.Th.U.	Actual Evaporating Power from and at 212° F.
American Residuum	.886	350	19,627	15
Russian Ostatki	.956	308	19,440	14.8
Texas	.945	244	19,242	14.79
Burma	.920	230	18,864	14.5
Barbadoes	.958	210	17,718	14.2
Borneo	.936	285	18,831	14
Shale Oil	.875	288	18,217	13.8
Blast Furnace Oil	.979	206	16,080	12
Heavy Tar Oil	1.084	218	16,050	12

The chief advantages of liquid Fs. are: (1) Greater calorific power and less weight; (2) occupies less space; (3) convenience of storing and loading; (4) greater speed in getting up steam; (5) complete control over combustion. Against these must be set the danger of explosion of stored oil, loss by evaporation, and in some localities increased cost. In oil engines the vapour of the oil is exploded with air in the cylinder, the heat thus generated providing the motive power. When used for producing heat, the petroleum is injected into the furnace in the form of a spray. The most generally used method now consists of the direct pulverisation of the oil so as to drive it direct into the furnace chamber in

injectors are those of Holden of the L.N.E. Railway, those of Messrs. Rushden and Eeles, and those manufactured by Messrs. Armstrong, Whitworth & Co., invented by E. L. Orde. When liquid F. is atomised by an injector, the burning vapour as it rushes out is generally brought into contact with either a layer of F. or brickwork near the mouth of the furnace; or in some cases the furnace is bricked all the way round. Brickwork when so used should be jointed so as to allow plenty of room for expansion, or it will become buckled and the outside will fuse. It becomes heated to a very high temperature, and helps to ignite the oil vapour and air which enter the furnace; if the oil jet is made to

dash against it, it serves to disintegrate and gasify it; it also prevents the flame from passing too rapidly through the furnace and saves the plates from the direct impact of the former. For this purpose various forms of brick baffles are also used.

Gaseous Fuels are now used in many metallurgical processes, as in the Siemens-Martin steel process. Re-heating and other furnaces also use gaseous fuel; and in the various types of gas engine gas is extensively used as a prime motor. Large quantities of combustible gases are obtained from the earth in the U.S.A., Russia, China, and other places; these are known as 'natural' gases. The natural gas found in Pennsylvania and Baku contains from 80 to 90 per cent. of methane, and is the most valuable of gaseous Fs. from a calorific point of view, but the supply is diminishing. Manufactured gases are of four main varieties: (1) Coal gas, produced by the distillation of coal in closed retorts; (2) water gas, made by the action of steam on incandescent carbon; (3) generator or producer gas made by the passage of air through incandescent carbon; (4) mixed producer and water gas, called semi-water gas, made by the passage of both air and steam over highly heated F. Coal gas is used for lighting, heating and cooking purposes and for gas engines; it is increasing in favour for both power and F. purposes. When used for the latter purpose it is burnt at a very high temperature, mixed with air in atmospheric burners; important features are the absence of moss, dirt, and smoke, and the ease and exactitude with which it can be regulated. Water gas depends for its formation upon the fact that at a high temperature carbon has a greater affinity for oxygen than has hydrogen, and that when steam and carbon in any of its amorphous forms are heated to such temperatures, the steam is decomposed, with liberation of either carbon monoxide or carbon dioxide, according to the temperature and the quantities of steam and carbon interacting. The value of water gas thus produced depends on the closeness of the approximation to ideal conditions. Water gas is largely used for welding and other engineering works, and when mixed with the gases formed by the decomposition of various grades of oil, forms the basis of carburetted water gas. Producer gas, which possesses the least thermal value of the four varieties, is a mixture of carbon monoxide and nitrogen. Air is passed through a column of heated coke, when the carbon at the lower surface thereof combines with

the oxygen of the air to form carbon dioxide; this is turned into carbon monoxide by contact with the heated carbon over which it has to pass, and in combination with the residual nitrogen from the air, forms producer gas. Siemens's producer gas differs from ordinary producer gas in that small coal or slack is used instead of coke. The gas thus produced has a higher thermal value. Mond's gas is an extremely cheap form of producer gas, made from a cheap bituminous coal slack. Arrangements exist in the process for the recovery of ammonia, which in other producers is wasted, and a sufficient quantity is recovered to pay for the F. used, thus compensating for the low calorific power of the gas. The large amount of carbon dioxide and nitrogen present accounts for the low thermal value of producer gas. Gas generators which work on the suction system find considerable use for the working of gas engines. The charge of gas is drawn into the engine directly from the producer, in which a mixture of air and steam is drawn over red-hot anthracite. The cylinder is in direct communication with the producer, and the back stroke of the piston causes a fresh mixture to be drawn over the anthracite. A cheap form of gaseous F. is thus obtained, when required, by a self-contained plant.

A large number of gas generators is now made in which air and steam are simultaneously passed through incandescent F. in such proportions that the formation of producer gas, by the partial combustion of the carbon and the hydrogen of the air, raises the temperature in the same ratio as the decomposition of the steam, by the red-hot carbon, into water gas, lowers it. Thus a uniform temperature obtains in the generator, and a gas is produced which is practically a mixture of generator or producer gas with water gas, but which has a higher calorific value. The systems of Wilson, Dowson, Dawson, and Duff are based on this principle. The gases which until recently were blown to waste from the mouth of gas furnaces are now made use of, and have been shown by Bryan Donkin to be suitable for specially constructed gas engines. In the case of furnaces in general, increasing use is being made of the so-called 'waste-heat' of the products of combustion. The heat is generally recovered by passing the gases through fire-tube boilers.

The heating value of a gaseous F. can be calculated by assigning to each constituent its calorific value, when the proportions of the mixture of combustible gases in the F. are known by chemical analysis.

Analysis does not reveal the manner in which the hydrogen and oxygen are combined with the carbon, but merely the percentage of each element present; the heating value cannot therefore be calculated from analytical data with any degree of accuracy. An experimental determination is thus not only the simplest, but also the only reliable method of finding the calorific value of a solid or liquid F., and as an exact chemical analysis of a mixture of gases is a tedious and difficult operation, the experimental method is better in the case of a gaseous F. Instruments for finding the heating value of a F. are known as calorimeters. In all calorimeters the method adopted is to burn a weighed quantity of the F. in oxygen so as to impart the heat produced to a known quantity of water. The

or holder should contain kieselguhr, on to which the oil should be dropped. For testing the heating power of a gaseous F. a Simmance-Abady calorimeter is one of the best; this is a modification of the original Junker calorimeter, and is constructed as follows:—

The gas to be tested is burnt in a Bunsen burner and the products of combustion are made to pass downwards through a number of tubes set in the vessel, through which a constant flow of water is kept running in the opposite direction. To prevent loss of heat by radiation the outside of the vessel is lagged with wood. Thermometers for recording the temperature of the water at the inlet and outlet of the supply pipes are set close to one another at the top of the calorimeter, whilst an open glass tube at the out-

Approx. Composition of Various Gaseous Fuels. % by Vol.

Constituent	Coal Gas		Water Gas (Blue)	Producer Gas (from Coke)
	Horizontal Retorts	Vertical Retorts (20% steam)		
Carbon Dioxide . . .	2.8	4.5	4.0	5.4
Illuminants . . .	3.3	1.8	—	—
Oxygen . . .	0.5	0.3	0.6	0.6
Carbon Monoxide . .	9.0	17.8	41.0	25.0
Hydrogen . . .	49.4	51.6	50.0	13.0
Methane . . .	25.0	18.2	0.4	0.4
Nitrogen . . .	10.0	5.8	4.0	55.6

many varieties in use differ in the method of carrying out the combustion of the F. and of imparting the heat to the water, but may all be referred to one or other of three types. (1) Where the combustion of the F. is effected with the admixture of a solid oxidising agent, as is done in the Lewis Thompson calorimeter. (2) Where the combustion is carried out in oxygen at constant pressure; (a) when the temperature of the escaping gas is undetermined, as in the William Thomson calorimeter; (b) when the temperature of the escaping gas is under control, as in the Fischer calorimeter. (3) Where the combustion is carried out with oxygen at constant volume, as in the Berthelot, Mahler, Mahler-Donkin, or Mahler-Krocker calorimeters. The bomb calorimeter, belonging to the third class, is the most accurate, but that of Lewis Thompson is the most widely used, although the least accurate, as it is very easy to manipulate. All the above calorimeters are primarily designed for solid F., and if liquid F. are to be tested, the platinum crucible

let serves as a gauge for detecting any changes in the volume of water passing through the instrument. Another thermometer is placed at the exit for the observation of the cooled products of combustion. The outlet pipe for the water is provided with a tilting bucket by which the stream of water can be turned into a measuring cylinder or into the waste funnel, as required. The difference in temperature between the inlet and outlet thermometers, multiplied by the volume of water collected in the measuring cylinder, and divided by the quantity of gas consumed, will give the calorific power of the gas. With the introduction of the Gas Reg. Act, recording calorimeters, which give a continuous record of the heating value of the gas, have come into use. These ingenious instruments correct automatically for changes in barometric pressure, temperature, humidity, and specific gravity of the gas. The most important types are the Fairweather and the Thomas. The Simmance-Abady calorimeter is easily modified

for use with light oils, alcohol, etc., a small lamp on a sensitive balance is used instead of a gas burner and meter. For further details see the articles on GAS, HEAT, and COAL, and the various gases herein mentioned. See also E. J. Mills and F. J. Rowan, *Fuel and its Application*; R. Galloway, *Fuel*; P. Bateson, *Fuel Purification*, 1891; L. T. Wright, *Liquid Fuel*; Sir E. Lowthian Bell, *Gaseous Fuel* (J.I.S.I., vol. ii.), 1889; H. L. Payne, *Fuel Value of Gases*; F. J. Rowan, *On Gas Producers* (P.I.C.E., vol. lxxxiv.); D. Siderski, *Essai des Combustibles*; P. Mahler, *Etudes sur les Combustibles, Solides, Liquides et Gazeux*; O. Pfeiffer, *Das Gas als Leucht-, Heiz- und Kraftstoff*; *Trans. of Institute of Gas Engineers*; and *Journal Institute of Fuel*.

Fuel Research Board. The F. R. B. of the Dept. of Scientific and Industrial Research was established in 1917, with the late Sir George Beilby (q.v.) as the first director. The Board, in its first report, stated that the two main lines of research envisaged were, in the first place, a survey and classification of the coal seams in the various mining districts of Great Britain by means of chemical and physical tests in the laboratory, and, in the second place, an investigation of the practical problems to be solved before any large proportion of the raw coal burned could be replaced by the various forms of prepared fuel obtainable from coal by carbonisation processes. A Fuel Research Station was constructed at E. Greenwich containing the necessary plant, laboratories and offices. This has been extended as occasion has demanded and now includes horizontal and vertical retort plant and also low-temperature plants. The Survey of the National Coal Resources still forms an important part of the Board's work, while useful work has been carried out on low-temperature carbonisation. In addition much other useful work has been done and the results are available to the public in the form of excellent cheap Technical Papers published by H.M. Stationery Office. The present (1931) director of Fuel Research is Dr. C. H. Lander.

Fuente Ovejuna, a tn. in Spain, 45 m. N.W. of Cordova. It has mines of argentiferous galena, and one of its principal industries is meat-curing. It also produces a quantity of honey. Pop. 15,500.

Fuenterrabia, or **Fontarabia** (Fr. *Fontarabie*), a fortress in Spain in the prov. of Guipuzcoa, at the mouth of the R. Bidassoa, on the Fr. frontier, 9 m. from San Sebastian. In 1638 it was unsuccessfully attacked by the

Fr. under the Duke of Berg. In 1813, however, Wellington succeeded in crossing the Bidassoa, near the town, although strongly opposed by Soult. Milton confounds Fontarabia with Roncesvalles. Pop. 5500.

Fuero (Lat. *forum*), in Spanish law, a term of wide import, but generally used to denote: (1) General codes of law, or bodies of customs, such as the F. Viejo of A.D. 990, and the F. Juzgo; and (2) special tribunals having jurisdiction in cases relating to certain departments, such as the army and navy or the post office. F. Juzgo was the code of laws established by the Visigoths as the *forum judicum*, and which later, after the re-conquest of Spain, in the middle of the thirteenth century, by the Christians, continued to be administered by separate courts and judges for the Mozárabes, i.e. Christians who had lived under Mohammedan rule and assimilated themselves to the Arabs. This F. applied to Mozárabes wherever no provision was made by royal privilege, or by special charters, or Fs., as they are also called; such charters or Fs. being, as in mediæval England, privileges granted to cities or towns in consideration of the payment of dues to the owner of the land. No common tribunal administered the F. Juzgo, and it was subject to a great number of local jurisdictions. Many of its provisions are still in force, but a number of unchartered towns in 1260 adopted the F. Real, a code promulgated by Alonzo el Sabio in 1255, as a preliminary to a larger digest or code called Las Siete Partidas. But the latter, even when formally promulgated a century later, was expressly made subject to all existing Fs. The F. de Salamanca was a code of civil law promulgated in the beginning of the twelfth century for Salamanca, and there were a number of other such municipal Fs. for the government of different towns and the administration of justice in them. Spain was early the soil of a highly specialised local gov., acknowledging scarcely any relation to a central administration. In the provinces these written or unwritten codes of laws relating to legislative, judicial, and administrative functions were called Fs. or fors; those of the towns, *cartas-pueblos* (town or village charters). Like the common law of England, or rather the special customs (see under COMMON LAW, CUSTOMS, CONSUETUDINARY), these Fs. owed their strength to their immemorial antiquity, although unlike Eng. customary law they owed their formal recognition to some royal grant or grant by a lord paramount. As in England, some Spanish monarchs,

e.g. the Castilian, were bound on their accession to swear to observe the Fs., but when Spain became united under an absolute monarchy, most of the Fs. were openly violated, one marked exception, however, being the Fs. of the Basques. The F. de Correos y Caminos is a special court, having jurisdiction in matters appertaining to the post office and the roads; the F. de Marina, in naval matters and over persons in the navy; the F. de Guerra, in army matters and over persons in the army. The town F. is also used as meaning magisterial ordinances relating to communal fines and dues; acts of donation to churches or other religious bodies, and letters giving exemption from taxation. See Marina, *Ensayo historico-critico sobre la antigua legislacion y principales cuerpos leges de los reynos de Leon y Castilla*; Colmeiro's *Curso de derecho politico segun la historia de Leon y de Castilla*.

Fuerte Ventura, or **Forteventura**, one of the Canary Is., in the E. of the archipelago, separated from Lanzarote in the N. by the channel of Becania. Cap. Betancuria near the W. coast. Pop. 12,000.

Fuertes, Louis Agassiz (1874-1927), American painter and naturalist; b. Feb. 7, at Ithaca, N.Y.; son of Prof. Esteven Antonio F. Graduated at Cornell, 1897. Painter of birds from 1896. Illustrated, *inter alia*: *Birding on a Broncho*, 1896; *Song Birds and Water Fowl*, 1897; *The Woodpeckers*, 1901; *Birds of the Rockies*, 1902; *Handbook of Birds of Western U.S.*, 1902; *Cones' Key to N. American Birds*, 1903; *Handbook of Birds of Eastern U.S.*, 1903; *Birds of New York*, 1910; *Burgess's Bird Book for Children*, 1919. Lecturer in ornithology, Cornell. Died Aug. 22.

Fugitive Offenders Act, 1881. A person who has committed a crime in the British Islands, and who, to avoid arrest, has taken refuge in some other part of the British Empire, may be arrested and brought back under the Fugitive Offenders Act, 1881, either: (a) Upon a warrant duly endorsed by the colonial governor, or by a judge of the Supreme Court in the colony to which the offender has fled; or (b) upon a provisional warrant issued by a colonial magistrate upon such evidence and in such circumstances as would justify such a warrant if the offence had been committed within such magistrate's jurisdiction. These provisions extend also to countries to which the Foreign Jurisdiction Acts (q.v.) apply, but where the offender has escaped to any other foreign country, he can

only be got back under the terms of an extradition treaty. If the magistrate before whom the fugitive is brought thinks there is *prima facie* evidence of guilt, he may commit or send the accused back for trial to the country or place where he is alleged to have committed the offence (*locus delicti commissi*). When at the *locus delicti*, the accused is entitled to a trial within six months, and if not tried within that period, or if acquitted, he is entitled to be paid his passage money back either to the place of arrest or his intended destination at the time of arrest. In any case, if not sent back for trial within one month of committal, he is entitled to be discharged. The magisterial hearing of a case under this Act must be at Bow Street Police Court, and in Scotland before the sheriff of Edinburgh. By an Act of 1915, persons may be arrested for treason and other crimes, in any of the Colonies and Protectorates, and *vice versa*. See Beron and Chalmers on *Extradition*, 1903; on *Extradition*, 1907.

Fugitive Slave Laws. In the U.S.A., prior to the Constitution, there were no F. S. L., it being left to the comity (q.v.) of the different states or colonies to surrender slaves who had escaped from the places where they were held to service. In 1787 the different slave-holding states inserted provisions in their constitutions regulating the surrender of fugitive slaves, and these provisions later found expression in the Federal Constitution; and in 1850 Congress strengthened the provisions by regulating the mode of arrest, trial, and surrender of fugitive slaves. This Act was repealed in 1864. The F. S. L. are now of merely historical interest, as the amended constitution prohibited the slave trade altogether. In England, at a time when the status of serfdom existed (*glebe adscriptus*, attached to the soil), it was a generally recognised principle that a serf who succeeded in evading re-capture for a year and a day obtained his freedom, and further an English serf could always purchase his freedom. No analogous provisions are to be found in the old American F. S. L. It may be said, indeed, that the constitutional freedom of the English subject left no room for F. S. L.

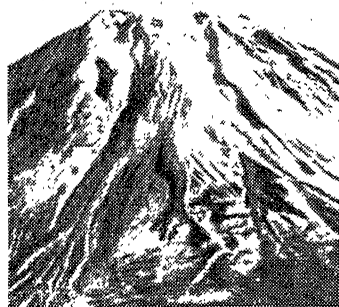
Fugue, the highest form of contrapuntal art, and the æsthetic and technical climax of the possibilities of the polyphonic school of music. A F. commences with the statement of a subject by one part, followed by the restatement, or answer, by a second part, during which the first proceeds with a counter-subject; the third and

succeeding parts being introduced in the same manner. When all the parts have been brought in, a free fantasia follows, in which the subject is developed at length, its contrapuntal possibilities being fully exploited by means of canon, syncopation, and the introduction of episodes; the section works up to a climax over a pedal-point, usually the dominant, and so leads to the recapitulation. In this section the material is greatly elaborated by various polyphonic devices, the whole work being thus brought to a conclusion in a passage of vigour and intensity (*stretto*). Although many sixteenth century experiments were designated by the title of *fuga*, they were nothing more than canons; it was not until the latter part of the seventeenth century that the true F. was accomplished. The greatest master of F. was J. S. Bach, who not only wrote many fine organ Fs. which have not been surpassed, but also originated the pianoforte F. in his *Wohltemperirte Klavier* (1722-44); whilst the early eighteenth-century oratorios of Bach and Handel contain some excellent examples of the choral F.

Fühnen, see FÜNEN.

Fuh-Shan, see FATSHAN.

Fuji-San, Fujino-yama, or Fujiyama, the highest mountain in Japan (about 12,450 ft. high), visible from Tokyo,



THE CREST OF FUJI-SAN

(Photograph from H. G. Ponting's 'In Lotus Land'.)

60 m. distant. It is a regular snow-capped volcanic cone, terminating in a most graceful peak, and is a favourite subject with Japanese artists. The last eruption occurred in 1707.

Fu-kien, see FOKIEN.

Fukui, a tn. in Japan, near the

N.W. coast of Honshiu, 86 m. N.N.E. of Kyoto. It became an important educational centre at the Renaissance. Paper is manufactured there, and it is noted for its silk manufacture and tinned crabs. It is one of the chief towns of the empire. Pop. 50,155.

Fukuoka, a tn. of Japan, on the N. coast of Kiushiu, 90 m. N.N.E. of Nagasaki. It has a number of fine streets and an old castle, and is famous for its silk and inwoven-picture fabrics. Pop. 80,000.

Fukushima, a tn. in Japan, in the prov. of Iwashiro, Hondo, 168 m. from Tokyo. An important centre for trade in raw silk and cocoons. Pop. 35,000.

Fukuyama: (1) A seaport of Japan 60 m. from Hakodate, formerly the seat of the lords of Matsumai. Pop. 10,000. (2) A tn. of Japan, 110 m. S.W. of Kobe, on the S. coast of Hondo. Pop. 15,000.

Fulahs, Fellata, Fellani, or Peulhs (plural Fulbe), an important ruling Hamite-Negro race in Nigeria and French Sudan, founders of the sultanates of Sokoto and Gando. They are of a light brown or copper colour, of good stature, with Caucasoid features, black hair, and negroid speech. Their name undergoes many changes, as indicated above. They seem to have migrated westward at an early period, and gradually extended their influence to the E. The F. is divided into four great branches, viz. the Jel, the Baa, the So, and the Beri, each containing several tribes. They number from about six to eight millions, and by the campaigns of 1897-1903 were obliged to acknowledge British suzerainty. See Lady Lugard's *A Tropical Dependency*, 1904.

Fulcrum, see LEVER.

Fulda, cap. of the prov. of Hesse-Nassau in Prussia, on river of the same name, 69 m. N.E. of Frankfort. A Benedictine abbey was founded here in 744, to which the town owes its origin, the abbacy being converted into a bishopric in 1752. Some of the most prominent buildings are the cathedral, erected early in the eighteenth century, containing the remains of St. Boniface, founder of the abbey; the old palace of the prince-bishops, and the church of St. Michael, consecrated in 822. F. also has a Catholic gymnasium, said to be the oldest of the kind in Germany. Since 1866 it has belonged to Prussia. Its chief industries are weaving, spinning, dyeing, tanning, etc., and it manufactures textiles, plush, leather, metal goods, musical instruments, farm machinery, etc. Pop. 30,000.

Fulda, Ludwig (b. 1862), a Ger. poet and dramatist, b. at Frankfurt-on-Main. He studied at Heidelberg, Berlin, and Leipzig, and in 1894 went to Munich, where he stayed two years. Since then he has lived in Berlin. His one-act verse comedy, *Die Aufrichtigen*, gained him a prize in a competition in 1882, and his dramatic career may be said to have begun with his tragedy, *Christian Gunther*, the same year. This was followed by a series of comedies, including *Ein Meteor* and *Die wilde Jagd*, and some dramas, amongst which are: *Das verlorene Paradies* and *Die Zwillingsschwester*. In 1893 he won the Schiller prize with his dramatic fairy tale, *Der Talisman*, F. also wrote *Jugendfreunde*; *Kaliwasser*; *Novella d'Andrea*; and a volume of dramatic studies, entitled *Aus der Werkstatt*. His translations from the French are masterly, notably those of Molière, under the title of *Meisterwerke*; and Rostand's *Les Romanesques* and *Cyrano de Bergerac*. F.'s verses are distinguished by their epigrammatic wit, and his plays are very skillfully contrived. His more recent works include: *Amerikanische Eindrücke*, 1906; *Der Dummkopf*, 1907; *Herr und Diener*, 1910, *Des Esels Schatten*, 1921; and *Die Rückkehr zur Natur*, 1914. F. lectured in U.S.A. in 1906.

Fulgentius, Fabius Planciades (c. 480-550), a Latin writer and grammarian of Africa of the sixth century, supposed to have been a bishop of Carthage, probably related to Fulgentius of Ruspe. His works represent the late African style. The *Liber Physiologus* and others are lost, but four works attributed to him are extant: *Mythologicon Libri III.*; *Expositio Vergilianæ Continentiæ*; *De Aetatibus Mundi*, and *Expositio Sermonum Antiquorum* (untrustworthy, often printed with the *De Compendiosa Doctrina* of Nonius). See *Fulgentii Opera* (Hein's edition), 1898; Zink, *Der Mytholog Fulgentius*, 1867; Ersch und Gruber, *Allgemeine Encyclopädie*.

Fulgurites (Lat. *fulgur*, lightning), in petrology, the name given to rocks whose surface has been fused by lightning, and to the characteristic holes thus formed. Examples of the kind have been found on Ararat, in the Alps, Pyrenees, and elsewhere, the surface showing in parts a thin, glassy crust or film, like a coat of varnish. Another kind of F. (vertical sand-tubes, sometimes half an inch in diameter) is found in dry sands, as on the sand-hills of S. America and N. Africa. They often run downwards in the sand for several feet, branching off and gradually lessening in their

course. The glassy material is seen under the microscope to contain grains of sand and many small cavities. Minerals like mica and felspar are fused more easily than quartz, but sometimes silica abounds in F. glasses.

Fulham, a parl. bor. and suburban par. of London co., England, 2 m. from Hammersmith, 5 m. from St. Paul's, on R. Thames, just opposite Putney. Putney Bridge and Parson's Green are its nearest stations on the Metropolitan Railway. F. Palace has been a residence of the bishops of London since 1141, the present building being mostly about a century old, surrounded by beautiful grounds overlooking the river. The tombs of many bishops are in the church, and the place has memories of Bodley, Florio, Hallam, Crotch, and others. The fine market-gardens are now mostly built over. F. returns one member to Parliament. Pop. 157,000

Fulica, see Coor.

Fuller, George (1822-84), an American artist, noted as a portrait painter. He studied under H. K. Brown, the sculptor, in Albany (1842-43), exhibiting a portrait of him in 1857, and becoming associate of New York National Academy. He had an original, poetic style, and was a fore-runner of the Idealistic school. He travelled in Europe in 1860. His best works are: 'The Romany Girl,' 1879; 'She was a Witch'; Winifred Dysart,' 1881; 'Turkey Pasture in Kentucky,' 1878. See *Boston Art Journal*, July 1877; van Rensselaer, *Six Portraits*, 1889; 'Three Boston Painters' in *Atlantic Monthly*, Dec. 1877.

Fuller, John Frederick Charles (b. 1878), British soldier who has gained fame in connection with the development of Tanks. b. Sept. 1; entered the Oxfordshire Light Infantry 1898. Promoted Colonel 1920, Major-General 1930. Campaigns—S.A. War 1899-1902, and Great War. It was mainly through his energetic advocacy and the part he played in the use of Tanks in the Great War that the weapon became a success not long after it was first used at the battle of Cambrai (q.v.). His work *Tanks in the Great War*, 1914-18, reveals the grip he had on the potentialities of this war machine. He has held Staff appointments continuously since 1907. In 1917 he was on the Tank Corps Staff in France, and the next year he was on the War Office Staff in the capacity of Tank expert. When it was decided to introduce mechanised brigades he was appointed Military Assistant to the Chief of the Imperial General Staff in 1926. He has written numerous works of military science, the

more noted being: *The Generalship of Ulysses Grant*; *Foundations of the Science of War*; *Sir John Moore's System of Training*, and *British Light Infantry*.

Fuller, Sarah Margaret (1810-50), an American critic and essayist, b. on May 23, at Cambridgeport, Mass. She was educated by her father, a stern and unbending taskmaster, who exerted a great influence on the shrinking and sensitive nature of his child, and whose exactions helped to impair her never robust health. On his death, Sarah, as the eldest of the family, helped to support her brothers and sisters by public and private teaching in Boston. In 1839 she issued a translation of the *Conversations of Goethe with Eckermann*. She became a member of the Transcendental Club, in which Emerson took a prominent part, and on the foundation of the *Dial*, the literary organ of the club, she accepted the editorship, with George Ripley as assistant editor. This was in July, 1840, and for two years Margaret Fuller struggled to keep the paper alive in the face of financial stress, but after two years of voluntary service in the cause she was obliged to relinquish it; for another two years Emerson kept the publication from annihilation, but finally in 1844 it ceased to exist. In 1844 Margaret published her first volume, *Summer on the Lakes*, and in 1845 *Woman in the Nineteenth Century*. In the same year she joined the staff of the *New York Tribune* as literary critic, under Horace Greeley, and in 1846 her contributions to the paper were reprinted as *Papers on Literature and Art*. In the next year she went to reside in Italy, and in Rome she met her husband, Giovanni Angelo, Marquis Ossoli, an adherent of Mazzini. During the siege of Rome in 1849 by the French, she took charge of a hospital; but after the capitulation of the city and the total loss of her husband's property she decided to return to America. Setting sail with her husband and her infant child on May 17, 1850, she made a successful voyage until nearly arrived at New York. Then on July 16 the vessel was wrecked on Fire Island Beach, and she and her husband and child were drowned. The child's body was later washed ashore, but nothing was ever seen again of the parents. Thus perished a woman remarkable for her culture, her courage, and greatness of intellect. Her *Autobiography*, with memoirs by Emerson, Channing, and Clark, was published posthumously in 1852, and several Lives have been written, notably those of Julia Ward Howe, 1883; Thomas Wentworth

Higginson, in 1884, and K. Anthony, in 1922.

Fuller, Thomas (1608-61), an English author and divine, b. at Aldwinkle in Northamptonshire, his father being rector of the parish. He went to Queens' College, Cambridge, where he graduated, and two years later (1630) was appointed to the curacy of St. Benet's. He became rector of Broadwindsor, Dorsetshire, in 1634, but gave up his living in 1641 and settled in London, taking a curacy at the Savoy church in the Strand. His *History of the Holy War* had appeared in 1639, and on coming to London he published the *Holy and Profane State*, 1642, his most characteristic work. He was a



THOMAS FULLER

chaplain in the Royal army during the Civil War, and a strong adherent of the Royal cause, and during this time wrote, for the encouragement of his men, *Good Thoughts in Bad Times*, and a sequel, *Better Thoughts in Worse Times*. In 1648, he was appointed to the living of Waltham in Essex, and ten years later received the living of Cranford in Middlesex. At the Restoration, he was appointed chaplain extraordinary to the king. One of F.'s characteristics is his quaint humour, though his wit is never forced, and, like Hood, he plays upon words instinctively. His writings are remarkable for wisdom and imagination, as well as pathos, when occasion demands. Amongst his numerous works, besides those already referred to, may be mentioned: *A Pisgah Sight of Palestine and the Confines Thereof*, with maps and views, a geographical account of the Holy Land; *The Church History of Britain from the Birth of Christ until the Year 1648*; *The Worthies of*

England; and *Mix'd Contemplations in Better Times*, etc. See Bailey, *Life of Thomas Fuller, with Notices of his Books*, 1874; Lives by Russell, 1844, and Morris Fuller, 1884; selections by Rogers and Jessop; and criticisms by Coleridge, Southey, and Lamb (the last with specimens).

Fuller's Earth (A.-S. *fullere*, from Lat. *fullo*, fuller), a pulverulent material resembling clay in appearance, fine-grained, and of a variable colour without plasticity, formerly much used for fulling cloth and wool, that is, cleansing these materials of oil and grease, from whence it derives its name. Nowadays, it is more generally employed for clarifying cottonseed and lubricating oil, as a filtering material, absorbing their impurities. F. E. was at one time only mined in England, chiefly at Nutfield, near Reigate, Surrey, and was considered of great value, its exportation being prohibited. Recently, however, deposits have been discovered in various localities in the United States, the value of the production there, chiefly from Florida, being over \$150,000. See *Mineral Resources of the United States*, issued by the U.S.A. Geological Survey (Washington, annually). Cimolite, a variety of F. E., is found in the island of Argentario, Greece, and has been mined from ancient times.

Fullerton, Lady Georgiana (Leveson Gower) (1812-85), an English philanthropist and novelist; daughter of the first Earl of Granville. Her earlier works include: *Ellen Middleton*, 1844, and *Grantley Manor*, 1847. In 1846 she entered the Roman Catholic Church and later wrote controversial novels on Catholic subjects, including *Lady Bird*, 1852; *Constance Sherwood*, 1865. See Coleridge, *Life of Lady G. Fullerton*, 1888, translated from the French of Craven; Oliphant, *Victorian Novelists*, and *Inner Life of Lady G. Fullerton*, 1899.

Fulleylove, John (1847-1908), an English oil and water-colour painter, especially of landscapes. He was early articulated to a firm of architects, and exhibited from 1871 at R.A., R.I., and R.B.A. His pictures show great feeling for colour and atmosphere, together with excellent drawing. He produced two series of drawings of the Oxford and Cambridge colleges and churches. F. became a member of the Royal Institute of Painters, 1879. See *Studio*, vii., 1896.

Fulminates, a class of salts derived from fulminic acid, C:N'OH; they are isomeric with cyanates, but explode violently when struck or heated. The two chief are fulminating mercury and silver. The first is obtained by heating mercury with alcohol and

nitric acid. The white, silky crystals are used in manufacturing percussion caps. Brugnatelli's fulminating silver was first obtained in 1798, a year before Howard's mercury, which merely substituted mercury for silver in the heating process. The white needles are bitter and poisonous. Fulminates of several other metals are known. See J. F. Thorpe, *Dictionary of Applied Chemistry*, 1922.

Fulminic Acid (C:N'OH), an organic acid isomeric with cyanic acid. Its salts or 'fulminates' are very explosive and used as detonators. The free acid is also very explosive, and the vapour poisonous like that of prussic acid. It and its salts are interesting inasmuch as they contain a bivalent carbon atom, the normal valency of element being four.

Fulton: (1) A vil. of Oswego co., New York, U.S.A., on the Oswego Canal, 24 m. from Syracuse. It is on the New York, Ontario and Western and other railways. It has flour, pulp, paper and woollen mills, and manufactures cutlery, machines, and guns. Pop. 12,462. (2) Cap. of Callaway co., Missouri, U.S.A., 26 m. from Jefferson City. It has a state asylum for the insane, and a deaf and dumb institute, the Presbyterian Westminster College, and the Synodical Female College. The fire-clay manufs. are important, and there are coal mines and mineral springs near. Pop. 6105.

Fulton, Robert (1765-1815), an American mechanician and engineer of Irish parentage. From 1786 he studied under West in England, taking out patents for several inventions. F. was in Paris, 1797-1804, and devoted considerable attention to steam navigation. By 1803 he had constructed a small steamboat which navigated the Seine. His inventions included flax-spinning and dredging machines, and a submarine or torpedo (*Nautilus*, 1801). Disappointed by his reception in France and England, F. returned to America, and was employed by the government in making canals. In 1807, with Livingston, he perfected the discovery of steam navigation, and launched the *Clermont*, which went from New York to Albany (150 m. in 32 hrs.). Speed was soon considerably increased. F. published *Treatise on the Improvement of Canal Navigation*, 1796; *Torpedo War*, 1810. See *Life* by Colden, 1817; Montgéry, 1825; Renwick in Spark's *Amer. Biog.*, x.; Knox, *Fulton and Steam Navigation*, 1886; Sutcliffe, R. *Fulton and the Clermont*, 1909; Thurston, *History of the Growth of the Steam-engine*; H. W. Dickinson, R. *Fulton: Engineer and Artist*.

Fulvia (d. 40 B.C.), a Roman lady noted for intrigue and ambition. Her first husband was Clodius, killed by Milo; her third, Mark Antony (44 B.C.). She had considerable power in Rome during the Civil War that followed Caesar's murder, and showed a vindictive spirit over the proscriptions. She instigated an unsuccessful revolt against Octavius, her son-in-law, during his absence in the E. Besieged in Perusia, she managed to escape to Athens, but was coldly received by Antony, and died soon afterwards at Sicyon. See Cicero, *Philippics*, ii.

Fumage, see HEARTH-MONEY.

Fumaric Acid, an acid geometrically isomeric with maleic acid, and possessing the formula $\text{HOOC}\cdot\text{CH}:\text{CH}\cdot\text{COOH}$. It occurs in various fungi, in the fumitory (*Fumaria officinalis*), and in Iceland moss. It may be prepared by heating malic acid alone to 150°C ., or by heating it with hydrochloric acid or hydrobromic acid, and by boiling monobromosuccinic acid with water ($\text{HOOC}\cdot\text{CHBr}\cdot\text{CH}_2\cdot\text{COOH} = \text{HOOC}\cdot\text{CH}:\text{CH}\cdot\text{COOH} + \text{HBr}$). F. A. is a white crystalline solid, which when heated yields maleic anhydride and water. See MALEIC ACID.

Fumay, a tn. of Ardennes dept., France, on R. Meuse, 16 m. from Mézières. It has slate quarries, breweries, and engineering works. F. stands among wooded heights, two being known as 'Dames de la Meuse.' Pop. about 5800.

Fume Precipitation, Electrical. This method, known also as electrostatic precipitation, is associated with the names of Lodge and Cottrell. Although attempts to precipitate smoke electrically were described by the Ger. Hohlfield in 1824, the first attempts at industrial application coincided with the work of Lodge (1884), and the first successful installation was in America in connection with the removal of sulphuric acid mist from smelter gases. The principle of electrostatic deposition consists in passing the gas to be treated through an intense electric field between a central electrode at high potential and the walls of earthed plates or tubes. The tubes, which may be of various materials depending on the nature of the gases treated, are frequently arranged in batteries or groups, the distance between the electrodes varies from 2 to 6 inches, while the voltage may be between 30,000 and 100,000, and is regulated to give as strong a glow discharge as possible without disruptive or spark discharge. On passing through such an apparatus the particles of dust, mist or fume become charged, and

are immediately attracted to and deposited on the larger electrode surfaces of opposite polarity. If liquid, the particles coalesce and flow away, if solid, a tapping device is provided to dislodge the dust which collects at the base of the apparatus. The high-tension direct current necessary for charging the central electrode is obtained from a rectifier supplied from a step-up transformer. There are three chief types of rectifier: (1) the thermionic valve, (2) the mechanical or commutator type, (3) the Westinghouse metal (copper oxide) rectifier. The valve is fragile and has a life of only about 1500 hours' continuous working; the commutator-rectifier produces sparks and may cause interference with radio reception in surrounding districts. The metal rectifier represents the most recent development in the rectification of high tension voltages and is embodied in the Simon-Carves system. Electrostatic precipitation removes sulphur trioxide from gases by the formation and precipitation of sulphuric acid mist, so that moisture content and temperature are important considerations. According to Howard (*Trans. A.I.M.E.*, 49, p. 540) for the removal of sulphur trioxide and dust from copper furnace fumes, a gas velocity of less than 15 ft. per second, a temp. of about 90°C . and a water content equal to about 4 per cent. by weight of the dust collected, give the best results. The process has also been applied successfully to the electrostatic precipitation of various metallic and acid fumes, to the dust from cement kilns and, more recently, to the treatment of smoke and dust from power plants and the removal of tar from carbonisation gases. The efficiency of removal is generally over 99 per cent. *Bibliography*: Lodge, *J.S.C.I.*, vol. 5, pp. 752-6 (1886); Bush, *J.S.C.I.*, vol. 41, pp. 22-28 T. (1921); Gloag and Woollam, *Fuel*, vol. 10, p. 138 (1931).

Fumigation (from Lat. *fumigare*, to smoke), the operation of burning, or volatilising substances in order to produce vapours calculated to destroy disease germs, vermin, etc. The use of F. as a disinfecting process is now practically restricted to steam and hot-air disinfection. Other measures, such as the burning of resins, camphor, etc., have little or no effect on micro-organisms, and preserve their popularity by virtue of the powerful odours which effectually disguise any smell of putrefaction. F. for the destruction of vermin is effectively carried out in the case of house vermin by burning sulphur. The paper should be stripped from the walls, the

room made as air-tight as possible before the sulphur is lighted, and the fumes should then be left for some time to penetrate into every corner and crevice. A favourite manner of ridding the garden of insect pests is to fumigate with tobacco smoke. This is best done by enclosing some strong tobacco mixed with organic refuse in a wire cage, getting it well alight by swinging the cage in the air, and then leaving it to smoulder in close proximity to the plants to be treated. In medicine, F. means the treatment of the skin with the vapours of drugs; calomel is often absorbed in this way.

Fumitory, the popular name given to species of *Fumaria* (q.v.), a genus of herbaceous plants.

Funchal (Portuguese, place of fennel), the cap. of Madeira, on the S. side of the island. The town is well built and picturesque, containing a cathedral, opera-house, and a museum. Its streets are narrow, and in the place of wheeled vehicles, sleds are used, drawn by oxen. The harbour of F. is the only port in Madeira for ocean-going steamers. It exports fruits, wine, embroidery, etc. F. has come into prominence as a health resort on account of its mild climate and is largely visited in the winter by convalescents. Magnificent scenery is presented by the neighbouring mountains. Pop. about 19,000.

Function, in mathematics, a number whose value is dependent on the value of another number or other numbers. Any symbol which may take on one of a class of values, and is not restricted to a single value, is called a variable. A casual labourer's yearly income, which may fluctuate within certain fairly definite limits, is, therefore, a variable quantity. If it fluctuates simply because he cannot work on wet days, its value depends on the number of wet days in the year; the labourer's income may then be said to be a F. of the number of wet days in the year. If it depends on other causes also, such as the general prosperity of the district, his personal health, etc., it may be stated as a F. of many variables. In algebraical language, the variable y is called a F. of the variable x if to every value of x there corresponds one or more values of y . Such quantities as ax , $ax+b$, x^n , $\sin x$, $\log x$, etc., are all Fs. of x . When a quantity involves the first power of x only, as in $ax+b$, it is said to be a linear F., or F. of the first degree; when it involves the second power of x and no higher power, as in ax^2+bx+c , it is said to be a quadratic F., or F. of the second degree; when it involves the third power of x and no higher power, as in ax^3+bx^2+cx+d , it is said to be a cubic F., or F. of the

third degree; in general, a F. of the form $a_0x^n+a_1x^{n-1}+a_2x^{n-2}+\dots+a_{n-1}x+a_n$ is said to be a F. of the n th degree. Functions are indicated by the signs f , F , ϕ ; thus, if y is a function of x , the relation is shown by the equation $y=f(x)$. Where there are two or more variables, the relation is indicated as in $y=f(x, r)$ and $y=f(x, r, s)$. The variable on which the value depends is called the independent variable, that whose value depends on the independent variable is called the dependent variable; thus in the relation $y=f(x)$, x is the independent, and y the dependent, variable. A F. is said to be *homogeneous* when all its terms are of the same degree. A *rational and integral* F. is one where the indices of the variable are positive integers and the coefficients do not involve the variable, as in the form $a_0x^n+a_1x^{n-1}+a_2x^{n-2}+\dots+a_{n-1}x+a_n$.

A *symmetrical function* is one in which any two variables may be interchanged without altering the value of the F. Thus $x^3+y^3+z^3-xyz$ is a symmetrical F. An *alternating function* is one where, if two variables are interchanged, the F. is altered in sign but not in value. Thus $a^2(b-c)+b^2(c-a)+c^2(a-b)$ is an alternating F.

Derived functions may be obtained in this way. Let $f(x)=a_0x^n+a_1x^{n-1}+a_2x^{n-2}+\dots+a_{n-1}x+a_n$. Then $f(x+h)=a_0(x+h)^n+a_1(x+h)^{n-1}+\dots+a_{n-1}(x+h)+a_n$. Expanding, we get $a_0x^n+a_1x^{n-1}+\dots+a_{n-1}x+a_n+h[n a_0x^{n-1}+(n-1)a_1x^{n-2}+\dots+a_{n-1}] + \frac{h^2}{2}[n(n-1)a_0x^{n-2}+(n-1)(n-2)a_1x^{n-3}+\dots+2a_{n-2}]+\dots + \frac{h^n}{n}$

$[n(n-1)(n-2)\dots 2.1a_0]$. This result is written more concisely as $f(x+h)=f(x)+hf'(x)+\frac{h^2}{2}f''(x)+\dots+\frac{h^n}{n}f^n(x)$ and the numbers $f'(x)$, $f''(x)$, \dots , $f^n(x)$ are known as the first, second, \dots and n th derived functions of $f(x)$.

Limiting values.—In the equation $y=f(x)$, if, as the independent variable approaches a value a , the function $f(x)$ can be made to differ by as little as we please from a fixed quantity b , then b is called the limit of y , when $x=a$. Consider the series $1+\frac{1}{2}+\frac{1}{2^2}+\dots$. The sum $=2-\frac{1}{2^{n-1}}$ and is therefore a function of n ; that is, $S=f(n)$. But $\frac{1}{2^{n-1}}$ can be made as small as we please by increasing the value of n ; that is, the value of S can be made to differ from 2 by as little as we please. This is expressed by saying that the limit of S is 2 when n is infinite.

Fs. may be either *algebraical* or *transcendental*. An algebraical F. is one which may be expressed in a finite number of terms, and involves no other processes than those of addition, subtraction, multiplication, division, and root-extraction. All other Fs. are called transcendental, and include such Fs. as $\log x$, $\sin x$, $\cos x$, etc.

A F. is said to be *continuous* when an infinitely small change in the independent variable is accompanied by a correspondingly small change in the dependent variable. A F. is said to be *discontinuous* when an infinitely small change in the independent variable is accompanied by a great change in the dependent variable.

Periodic functions are those whose values recur regularly to certain limits, passing through all the values between those limits, while the independent variable increases or decreases in value by a certain definite amount called the period. To quote an example from trigonometry, $\sin A$ is a F. of A ; as A increases from 0° to 90° , $\sin A$ increases from 0 to 1; as A increases from 90° to 180° , $\sin A$ decreases from 1 to 0; as A increases from 180° to 270° , $\sin A$ decreases from 0 to -1 ; as A increases from 270° to 360° , $\sin A$ increases from -1 to 0; as A increases from 360° to 450° , $\sin A$ increases from 0 to 1, and so on. It is now seen that the limits of the values of the F. $\sin A$ are -1 and 1, and that the values fluctuate between these limits as the angle increases. The value of $\sin A$ is 1 when $A = 90^\circ$ or 450° or 810° . . . The period in this case is therefore 360° , and any values of the independent variable which have a difference of 360° give the same value for the dependent variable. This is expressed by stating that $f(x + \frac{1}{2}a) = f(x - \frac{1}{2}a)$ for all values of x , a being the period. The importance of periodic functions is best demonstrated by their use in connection with the theory of sound vibrations. Any periodic disturbance in air may be resolved into a series of sine curves. Fourier's theorem states that a single-valued periodic F. may be expressed as a convergent series, thus—

$$\frac{1}{2}A_0 + \sum A_n \cos \frac{2n\pi x}{a} + \sum B_n \sin \frac{2n\pi x}{a} + \dots$$

where a is the period and n has values from 1 to infinity.

Elliptic functions are usually defined with reference to elliptic integrals, so-called because certain types are expressed by the arc of an ellipse. The development of these Fs. is owing in a great degree to the labours of A.

M. Legendre (1752-1823), who published his *Traité des fonctions elliptiques* in 1827. His work was supplemented and to an extent revolutionised by N. H. Abel and C. G. Jacobi. A good introductory treatise is provided by A. C. Dixon in his *Elliptic Functions*.

Function, in physiology, the special activity of a cell, tissue, or organ. In organisms which comprise but a single cell, all the various types of activity necessary for the maintenance of the living state are undertaken by the cell as a whole; the amoeba, for example, performs the processes of engulfing its food, digesting it, excreting waste material and building up the nutrient matter into its own substance by chemical and physical actions in which all parts of the cell seem to join. Multicellular organisms, on the other hand, possess cells which are differentiated for special activities, and their form is determined by the work they are called upon to do. Again, certain cells take on a measure of continuity with each other to form tissues which are again differentiated according to the work they have to perform. Thus we have connective tissues, including the varieties: osseous tissue, cartilaginous tissue, fibrous tissue, adipose tissue, nervous tissue, epithelial tissue, etc. These tissues enter into the structure of organs with special activities; thus we say the F. of the stomach is to digest, that of the kidney to excrete waste liquid products, and so on.

Fundamental Base, in music, is the note on which a chord is built—the root, ground note, or generator. Thus in the chord CEG, C is the F. B. in whatever position the chord is written.

Fundamentalism is in its essence the opposition of orthodox churchmen to the teaching of modern science where the latter comes into conflict with the Bible story. F. has been particularly acute in the U.S.A., and especially since the Great War. It was, as it were, brought to a head when Dr. Harry Emerson Fosdick was called to the First Presbyterian Church of New York City and in 1922 preached a sermon in which he attacked the theology of the conservatives. This led to widespread controversy, which had its culmination in 1923, when the General Assembly of the Presbyterian Church reasserted and reaffirmed the doctrine of 1910. This practically maintained that nobody could be a Christian within the meaning of the Presbyterian faith who did not accept as literally true the Virgin Birth, the physical resurrection of Jesus, the freedom from error of the Scriptures,

the doctrine of the atonement, and belief in miracles. But Fundamentalism came into nation-wide notice in the U.S.A. when a young school teacher, John T. Scopes, was arraigned in court on the charge of violating the Tennessee state laws which forbade the teaching of evolution in the state public schools. Scopes was a teacher in the high school in Dayton, Tenn. William Jennings Bryan, who had thrice run for the Presidency of the U.S.A., came to Dayton to take part in the prosecution of the case. Clarence F. Darrow, a great lawyer and famous free-thinker, acted for the defence. Newspaper men flocked to Dayton from all over the country. The immediate issue was a violation of a state law. But in its wider implications the case involved the serious question whether a state, through its legislature, could restrict scientific teaching when it conflicted with religious beliefs. The irreverent American journalists labelled the case 'the monkey trial.' Bryan solemnly argued for the literal truth of every word and every sentence of the Bible. He objected to the theory of evolution, because it ran counter to the Bible story of creation. The jury promptly brought in a verdict against Scopes and he was fined 100 dollars. Later the highest court of the state reversed the decision, doing so on a purely technical point of law. Mississippi afterwards passed a similar law and the Fundamentalists attempted to bring this about in some seven or eight other states, but their measures were killed by ridicule. Nevertheless the case had its repercussions in all the evangelical churches, there often being spirited battles between the Fundamentalists and the more radical and modernist laymen and clericals.

Funded Debt was the term originally used for a debt the service (administration and payment of interest) of which was secured upon some specified fund. But the term is now used without special application to any fund in respect of any large public loan raised for permanent purposes, bearing a certain rate of interest. When the loan is raised a date of repayment may or may not be quoted. The F. D. of the U.K. belongs to the latter category, but the gov. reserves to itself the right to redeem after a fixed period. Goschen's consols, a case in point, were made redeemable after 1923. The practice in general use in the U.K. for the reduction of debt is that of a sinking fund from which contributions should be made annually by the Chancellor of the Exchequer.

This practice is open to the objection that in the hands of a Chancellor who is not too squeamish, the sinking fund is open to inroads which may help him to tide over his difficulties for the time, but unfortunately do not help in the reduction of the national debt. Another practice adopted is that of conversion, by which means loans issued at certain rates of interest are converted into issues bearing a lower rate. Nations other than Great Britain in reduction of their F. Ds. usually adopt the practice of yearly purchase by drawings, the money for this purpose being supplied by a sinking fund.

Funds, see PUBLIC DEBT.

Fundy, Bay of (Fr. *fond de la baie*, head of the bay), an arm of the Atlantic Ocean separating Nova Scotia from New Brunswick and the state of Maine, extending 180 m. in length. It is exceedingly difficult of navigation, owing to the tides, which at certain seasons have a rise and fall of 53 ft., producing dangerous bores in the upper reaches. At low tide, the shores have the appearance of long stretches of mud-flats.

Fünen (Danish *Fyn*) is (with the exception of Zealand) the largest island of Denmark, situated between the Cattegat, the Little Belt, and the Great Belt. It is 50 m. long by 40 m. wide, and is fertile and well-wooded. Flax, fruit, grain and hemp are cultivated. Bee-keeping and cattle and horse rearing are carried on and form the principal export. The fisheries are also important. Chief towns: Odense (the cap.), Svendborg and Nyborg; area 11,000 sq. m.; pop. about 290,000.

Funeral Orations, formal and elaborate eulogies given by the anc. Gks. and Roms. on some great person recently passed away. F. O. combined the strongest points of demonstrative oratory and employed the highest type of eloquence. They were finished and elegant in style, and the encomium was specific—the finished life and its closed events being held up as an inspiration to the living for future guidance.

Funeral Rites, observances connected with death and burial. The care of the dead is a marked feature of religion among all nations and all classes, being associated with spirit, belief and custom. Among the Hindus the corpse is perfumed and adorned with flowers and then burned. The Mohammedans bury their dead; and, as is well known, the Egyptians always embalmed dead bodies (*see MUMMIES*). The mourning customs of the Jews may be collected from the Scriptures. In the religious creed of the Gks. and Roms., sepulture of the

dead was an act of piety to prevent the wanderings of the spirit on the shores of Styx. They burned their dead on funeral pyres, and deposited the ashes in an urn. Funeral expenses in law are a privileged debt allowed before all other charges, both in England and Scotland, if limited to the estate left by deceased. See BURIAL, CUSTOMS AND LAWS OF.

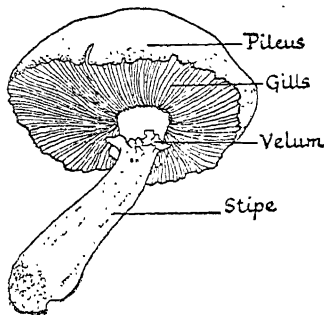
Funeral Shows, or Games, a practice restricted chiefly to the Gks. and Roms. of antiquity. In the heroic ages games were celebrated at the funeral of a great man (as of Patroclus, see *Iliad*, xxiii.). Scenic exhibitions or more frequently combats of gladiators (Bustuarii) took place among the Roms. See Servius, *ad Verg. Æn.*, x. 519; Horace, *Sat.*, ii. 3; Livy, xxxix. 46; Dion Cassius, xxxvii. 51; Cicero, *Pro Sull.*, xix.

Funeral Societies, see FRIENDLY SOCIETIES.

Fung-hwang, see FUM.

Fungi, one of two classes of plants belonging to the Thallophyta, the group which includes the more lowly organised plants. F. are distinguished from the algæ, the other class, by the absence of green colouring matter, or chlorophyll; hence they cannot assimilate carbon dioxide, but are dependent for food on organic substances. They are all either parasites, when they live on living plants or animals; or saprophytes, when they depend on dead organic matter for their food substances. Nearly all diseases of plants are due to the ravages of F., and the class includes forms which vary from a single cell, only visible under a microscope, to more highly specialised forms with conspicuous fructifications. The vegetative part, or mycelium, of the higher F., consists of a mass of intertwined threads, or hyphæ; in the common mushroom (*Agaricus campestris*) this constitutes what is known as spawn. The fructification is made up of the same sort of hyphæ, which are more closely packed together to form the stalk, on the apex of which is the umbrella-like cap; the spores are formed in the pink gills on the under-surface of the cap. All forms produce asexual spores, and in some members there is also a sexual process. There are six main divisions of F.: (1) Schizomycetes, which includes all the bacteria. (2) Myxomycetes, or slime F.; in these the body is a plasmodium, a creeping gelatinous mass. (3) Phycomycetes. To this division belong many moulds, the potato disease, 'damping off' disease, and many others. (4) Ascomycetes. This includes a great many forms, some unicellular, others of complicated structure, but all have an ascus, which is

a swelling cut off at the end of a hypha, and in it eight spores are formed. Mildew of roses, blue-green mould on jam, etc., the ergot of rye, yeast, witches' brooms on silver birch-trees are all members of this subclass; some of the higher forms have cup-shaped fructifications which are brightly coloured, e.g. *Peziza*. (5) *Æcidium* mycetes. The members of this group present a remarkably complex life history, and among them are the rusts and smuts. *Puccinia graminis* may be cited as an example; at one stage of its existence it forms conspicuous rusty red streaks down the stems and leaves of wheat, rye, etc.; in this stage orange red spores are formed, which on germination attack the wheat again. Later in the season the mildew appears, which is another



MUSHROOM

stage of the same fungus, when it is producing a different kind of spore, which can rest through the winter. On germination it gives rise to a few hyphæ which produce yet another kind of spore, which will only germinate on a totally different host, the common barberry. The disease on this plant takes the form of swollen discoloured patches on its leaves. (6) Basidiomycetes. These are the most highly organised of the F., and include mushrooms, toadstools, and puff-balls.

Fungus, in pathology, a term applied to a variety of morbid excrescences of the appearance of fungi. F. of the brain is really a hernia, the brain protruding through the skull. F. of the dura mater, or outermost membrane of the brain and spinal cord, consists of a tumour which perforates the skull. F. arthritis is a name given to tubercular disease of the joints, accompanied with the formation of a white spongy mass. Some members of the F. order

of plants are parasitic to man, causing diseased conditions; such are *Achorion schöleinii*, causing favus *Trichophyton tonsurans*, causing ring-worm, and *Actinomyces bovis*, or ray F., which causes the swelling of the jaw, known as actinomycosis (*q.v.*).

Fungus Melitensis, see CYNOMORIUM.

Funicular Machine, the name applied by some mechanics to a cord or chain attached at one end to a fixed point, the other end passing over a fixed pulley or friction wheel and having a weight suspended from it; a weight is also hung from the cord, or chain, in some part of its length, between the fixed end and the pulley. Thus, the cord becomes a mechanical agent, for unequal weights applied, as has been said, may be in equilibrio. When a cord is suspended in a vertical plane between two fixed points and acted on by weights at different places, it is called a 'F. polygon'; if the form of the suspended cord is given, and the weight to be applied at one angular point, the weights at all the other angular points in the case of equilibrium can be found.

Funk, Isaac Kaufman (1839-1912), an American author and publisher, born at Clifton, Ohio, and educated at Wittenberg College and Wittenberg Theological Seminary. He was ordained a minister of the Lutheran Church (1861), and after holding various pastorates, he started a publishing business (1876), in which he was joined by A. W. Wagnalls (1878), the firm being known since 1890 as Funk and Wagnalls Company. He edited the *Standard Dictionary*, founded the *Metropolitan Pulpit*, now the *Homiletic Review*, 1876, and various other papers, and wrote *The Next Step in Evolution*, 1902; *The Psychic Riddle*, 1907, etc.

Funkia, a genus of Liliaceae, occurs wild in China and Japan, but the five species are all hardy plants and will grow in Britain. The flowers are very showy and are often called plantain-lilies.

Funny-bone, the popular name for that part of the elbow where the ulnar nerve passes down the inner condyle of the humerus. The nerve being comparatively unprotected, a blow on this point will cause a tingling, pricking sensation down the whole length of the nerve to the ulnar side of the hand, followed by numbness. It has also been termed the crazy-bone.

Funston, Frederick (1865-1917), American major-general, b. Nov. 9, at New Carlisle, Clark co., Ohio; son of Edward Hoge F., an artillery officer. Educ. at Kansas State Univ. (Lawrence); reporter on Kansas City *Journal*; Connected with U.S. Dept.

of Agriculture, 1891-94; in Death Valley Expedition, 1891 as assistant botanist; in Alaska 1892-94. Travelled in Mexico. Entered Cuban insurgent army, 1896; rose to Lieut.-Colonel. Returned to U.S.A. on outbreak of Spanish-American War. Colonel 20th Kansas volunteer infantry, 1898. Sent to Philippines; captured the insurgent Aguinaldo, 1901. Brigadier-General U.S.A., April 1, 1901. In 1905, placed in command of dept. of California. After San Francisco earthquake of 1906, controlled martial law there. Took over administration of Vera Cruz, 1914, and in Nov. became Major-General. Wrote *Memories of Two Wars*, 1911. Died Feb. 19.

Fur, see FURS.

Fur, matter formed inside vessels through the lime in water, or similar constituents, used also of deposits left by damp. More frequently used as a verb, as, a kettle has become 'furred.' In this way it is also applied medically to a 'furred' tongue, one that has become coated with matter.

Furètière, Antoine (1620-88), Fr. lawyer and lexicographer, b. in Paris. Eminent as an advocate, but later took orders and became abbot of Chalivoy and prior of Chuines. His announcement that he had compiled a dictionary of the Fr. language brought about his expulsion from the Fr. Academy for alleged plagiarism, that body fearing that his dictionary was intended to supersede their own. F.'s dictionary was published two years after his death, and it is a valuable work. An improved edition was published by B. de Banval in 1701, and the last reprint was at Amsterdam in 1725. It has survived as the basis of what is called the Dictionnaire de Trevoux. F.'s treatment by the Academy was probably unmerited; but, however that may be, it gave rise to a warm and, indeed, scandalous exchange of aspersions between men of letters, in which even La Fontaine took part as F.'s friend, though later he turned foe. F. himself contributed to the exchange with his 'factums,' witty if ephemeral satire. His other works were *Five Satires* (verse); *Gospel Parables* (verse); *Le Roman Bourgeois*; and especially, *Furetièriana* (published posthumously), being a collection of bons-mots or anecdotes, which have often been parodied.

Furfuran, or **Furan** (C₄H₄O), an organic substance obtained by heating the barium salt of pyromucic acid with soda-lime. It is a colourless liquid boiling at 32° C., is insoluble in water, and has the characteristic smell of pine-wood tar, in which it occurs. A molecule of furan may be

looked upon as possessing closed-chains of 5 atoms; if the oxygen atom be replaced by sulphur, thiophene is produced; if it is replaced by NH, pyrrole is produced. *Furfural*, *furfural*, or *furfuraldehyde* ($C_4H_4O \cdot CHO$) is the aldehyde of pyromucic acid, and may be prepared by distilling bran with dilute sulphuric acid. It is a colourless liquid boiling at $162^\circ C.$, and is soluble to some extent in water. It has a pleasant smell, and turns brown on exposure to the air. When mixed with caustic potash, furfur-alcohol and pyromucic acid are formed, and it shows general properties analogous to those of benzaldehyde. With phenol (*q.v.*), furfural forms resins which are widely used in the manufacture of moulded articles similar to those made from cellulose, galolith, etc. Furfural and various of its derivatives are employed as solvents, germicides, etc. See Chicago Mines Laboratories Bulletin, No. 2 (1925), *Furfural and its Derivatives*.

Furies, or *Furiæ*, see EUMENIDES.

Furka Pass, one of the highest Alpine passes in Switzerland (7992ft.). It leads from Andermatt, in the canton of Uri, to the Rhone Glacier, passing through the Reuss Valley and ending at the Hotel Gletsch in Valais.

Furlong, a measure of length amounting to one-eighth of a statute mile. The original term was 'furrow-long,' and was the measurement of a furrow in the 'common-field' system, and in consequence varied according to the districts, but the side of a square containing 10 acres was the generally accepted length, 40 poles. In the ninth century the word *F.* was used to translate the Latin *stadium*, which was one-eighth of a Roman mile.

Furio Pass, a tunnel, some 40 yds. long, excavated in the Apennines, Italy. It is part of the Via Flaminia, the old Roman road from Rome to Fano on the Adriatic. An inscription at the N. end records that the tunnel was made by the Emperor Vespasian, A.D. 77.

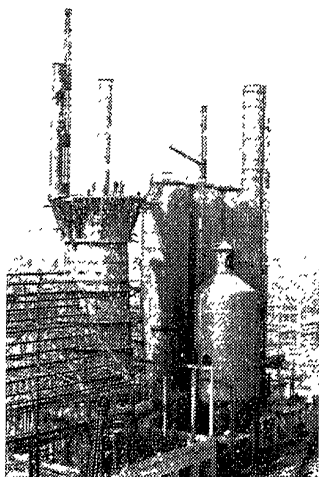
Furlough, a military term used for leave of absence. On home service it applies to non-commissioned officers and men, but on foreign service it is also applied to officers. When on *F.* a soldier may not leave the United Kingdom, and is in receipt of full pay.

Furnaces (Lat. *fornax*, a vault), contrivances for producing useful application of heat generated by the combustion of fuel. The number of different varieties and uses of *F.* is very great, but there are in the great majority of cases three essential parts. The fire-place is the portion of the *F.* where the combustion of the

fuel takes place, the place where the heat is applied to the special work of the *F.* is known by various names, such as the chamber, laboratory, hearth, working-bed, etc., and in addition there is the chimney, or some apparatus for supplying air under pressure to the fire. The class of fuel used and the intensity of the heat required are factors in determining the different modifications of *F.* In all cases the combination of economy and efficiency is desired; combustion should be regular, and the air and fuel mixed in correct proportions. *F.* may be classified into two main types, in the first of which the effect of combustion is simply the heating of the material to which the heat is applied, in the second a chemical change also occurs as a result of heating. *F.* for steam and for heating buildings are examples of the first type, whilst most metallurgical *F.* belong to the second type. The second class of *F.* may be subdivided as follows: (1) Where the fuel and the substance to be heated are in contact with each other: to this class belong shaft, blast, and hearth *F.* (2) Where the substance is heated directly by the products of combustion: these are reverberatory *F.* When the charge is not melted the *F.* is known as a 'wasting' or 'calcining' *F.*; when it is, as a 'melting' *F.* (3) Where the substance is not directly heated by the fuel or the products of combustion. When the heating chamber is fixed and forms part of the *F.*, the latter is known as a muffle *F.* Other varieties are crucible *F.* and retort *F.* There are four main objects to be studied; the greatest quantity of heat must be ensured, the dissipation of heat must be prevented, the heat must be concentrated and directed to the substance to be acted on, and it must be under the control of the operator.

In the *F.* of the first class, for heating boilers, a grate of fire-bars with short spaces between forms the receptacle for the fuel, and part of the air for combustion is drawn between these bars. As the fuel burns it is converted into gases, which burn above and in contact with the boiler. In addition to the air which comes through the fuel, a considerable quantity is admitted into the space between it and the boiler. The supply of air thus admitted is regulated by such contrivances as dampers; if too much is admitted, heat escapes up the chimney, whilst if too little, the combustion is retarded and unburnt fuel is wasted, and in both cases smoke is caused. Where possible a tall chimney provides the draught required, the sharpness of the draught varying as the height of the chimney. In ships

and locomotive steam engines a chimney cannot always be erected, and draught is then produced by fans, or by the action of a jet of exhaust steam. Blast F. are of very great antiquity, and forms differing little from ordinary smith's Fs. are now used in India. The Catalan and Walloon forges, formerly used in the production of malleable iron, mark stages in the development of blast F., which is the development of the science of iron-smelting (*q.v.*). Hearth Fs. are sometimes employed in the air reduction process of smelting iron, but they are very wasteful and have little to recommend them.



THE BLAST FURNACE AT THE FORD WORKS AT DAGENHAM

It is one of the largest in the world

Where the substance to be heated must not come into contact with the fuel itself, the operation of producing the heat must be performed in a special combustion chamber. This chamber is placed at the side of the hearth or working-bed, in which the material is exposed in a broad thin layer. The chimney is placed at the other end from the combustion chamber, and consequently the body of flame and the heated gas are drawn over the working-bed and beaten down by reverberation from the low vaulted roof which covers the hearth and the working-bed and slopes down to the base of the chimney. The pro-

portionate size of the working-bed and the hearth, and the shape of the latter, are determined by the special purpose for which the F. is designed. The term 'cupola' was originally used for the reverberatory F., but is now used to designate a small blast F., such as that used by iron-founders. The 'melting' reverberatory F. is used in the concentration of poor metallic compounds into a regulus by fusion, in the reduction of lead and tin ores, in the refining of copper and silver, and in the puddling processes of making malleable iron. The 'calcining' or wasting type of reverberatory F. has a less extended use. It is employed chiefly in the conversion of metallic sulphides into oxides by continued exposure to the action of the air at a temperature much below that of fusion, or in their conversion into chlorides by roasting with common salt. The most important of the F. which are used in industry are gas F. Besides the F. for which illuminating gas is used, on the Bunsen burner or blowpipe principle, and which are employed in small operations and in the laboratory, gas firing on a large scale is very extensively carried on. The origin of gas F. dates back to the patents granted to Frederick and William Siemens in 1856 and 1861. The earlier ideas on such a principle gave insignificant results, until Sir William Siemens, after twenty years of study, succeeded in giving the problem of Fs. a solution to which no new principles have yet been added. The original Siemens F. included a reverberatory with a very low arch. It had four chambers with the pre-heating of the gas and partial heating of the air; the inversion was effected by means of valves; the gas producers were situated at a little distance from the F., to which they were connected by a sheet-iron flue shaped like an inverted siphon. The draught of the producer was induced by the unequal length of the vertical legs. A gas F. has, in general, the following parts: (1) The gas-producer, in which combustible gases are generated by the incomplete combustion of the fuel by means of a first introduction of air, known as the primary air. The producer may have its own draught apparatus or may form a close part of the F. and depend upon its chimney. (2) The inversion valves, which direct to one side or the other the products of combustion and the gases required for the firing of the F. These valves do not always exist (not in the counter parallel current system of recuperation, for example), but form a division line, when present, between the regenerative chambers and the chimney on the one hand, and the

recuperative chambers and the gas-producer on the other. (3) The chambers of recuperation utilise those calories which would otherwise be carried away by the products of combustion. (4) The laboratory, or hearth, where the industrial operation is effected. The combustion of the fuel is here completed by a new influx of air, known as the secondary air. (5) The chimney, or the draught apparatus taking its place, discharges into the outer air the products of combustion, and at the same time ensures the circulation of the various gas currents. A number of dampers at the various flues of admission and exit complete the chimney so far as draught is concerned. The gas F. is in general use in metallurgy to-day, in the glass, gas, and by-products coke industries; it is also used in ceramics, though rarely. Its success is due to the easy regulation of combustion, which can be made perfect without excess of air, the possibility of a long flame and therefore of large F., and the use of fuel of inferior quality. The original perfection of the F., and the fact that regeneration permits high temperature as well as economy, have also contributed to its success. In the older methods of heating everything was confused. The old glass-pot F., for example, was formed of a hearth which contained the pots placed above the fire-grate without a stack. The only way of regulating the draught was by varying the depth of fuel in the grate. Under such conditions a high measure of skill was needed to obtain a satisfactory result. In a modern gas-fired F., the grate, the hearth, the chimney, and the recuperator are all distinct and may each be controlled in a methodical way.

F. in which coal gas, or hydrogen, were burnt with pure oxygen were formerly used when the highest temperatures were required, but electrically heated F. are now largely used. The advantages of electricity as a heating agent are the possibility of local application of the heat and the high temperatures obtained; against these are to be set its enhanced cost. Electric F. differ in type according as the product is to be obtained in the form of a gas, a liquid, or a solid (e.g. carbon disulphide, calcium carbide, and graphite). (For further particulars, see ELECTRICITY and ELECTROMETALLURGY.) For the casing, walls, pillars, etc., of F., ordinary building materials, such as red bricks, are used; for the parts which come in contact with the fuel or flame, refractory or fire-resisting materials are necessary. Such parts are the linings of fire-places, arches,

roofs, and flues, the lower parts of the chimney of a reverberatory F., and the whole of the internal walls of blast Fs. A list of fire-resisting substances may be given; for further particulars see under their names: fireclay and firebricks, certain sandstones, silica, in the form of ganister, Dinas stone and bricks, carbon (as coke and graphite), ferric oxide and alumina, in the form of bauxite. See IRON AND STEEL, ANNEALING, HARDENING, METALLURGY, SIEMENS, BESSEMER, etc. See also Mills and Rowan, *Fuel and its Application*, 1889; Baldwin, *Steam Heating for Buildings*, 1900; J. Cubillo, *Efficiency of Reverberatory Furnaces* (P.S.I., vol. vi.); Emilio Damour, *Le Chauffage Industriel et les Fours à Gaz*; J. Wright, *Electric Furnaces and their Industrial Applications*, 1906.

Furneaux Islands, also called **Flinnders**. A group of islands between Australia and Tasmania in the Bass Strait. Flinders, or Great Island, is the most important, others being Cape Barren, Clark, Hummock, and Babel. They were discovered in 1773 by Cook's lieutenant, Furneaux, from whom they take their name. They are for the most part barren and unproductive.

Furnes (Flemish *Feurne*), a tn. of Belgium in the prov. of W. Flanders. It is situated at the junction of several canals, 16 m. N.E. of Dunkirk, and 25 m. S.W. of Bruges. The principal industries are the linen manuf. and tan-yards; there is a trade in hops, corn, and dairy produce. Pop. 8000.

Furness, a peninsula of N. Lancashire, England, situated between the Irish Sea and Morecambe Bay. The ruins of F. Abbey stand in a deep valley S. of Dalton and adjacent to the F. Railway. It is interesting to artists and antiquaries, being a fine example of the transition Norman and early English architecture. The abbey was founded in 1128 for the Benedictines, who afterwards became Cistercians. The principal town of F. is Barrow (q.v.), noted for its docks and iron works.

Furness, Sir Christopher Furness, first Baron (1852-1912), a shipowner and shipbuilder, head of the shipping firm of Furness, Withy & Co. He was b. at W. Hartlepool, Durham. He started a shipbroking business when he was twenty-four years of age. He next established the F. line of steamers. In 1885 he joined Edward Withy and founded the present firm. In 1910 he was raised to the peerage as a baron, and took the title of Lord F. of Grantley. He was Liberal member for the Hartlepool, 1891-1910.

Furness, Horace H. (1833-1912), American Shakespearian scholar, *b.* at Philadelphia; graduated at Harvard, 1854, and spent some years in Europe. Spent his whole life in the preparation of a variorum Shakespeare. First volume, *Romeo and Juliet*, was published in 1871. He was interested also in homeopathy and spiritualism.

Furniss, Harry (1854-1925), Eng. caricaturist; *b.* March 26, in Wexford; son of a Yorkshire engineer; at the age of nineteen settled in London, and soon after became a regular contributor of humorous drawings to the principal illustrated papers. He joined the staff of *Punch* in 1880, and for many years was one of its most popular illustrators. He leapt into fame with his invention of the Gladstone collar, and became known all over the world for his picture (used since by Pears' Soap as an advertisement), 'Two years ago I used your soap, since when I have used no other.' An admirable humorist, he illustrated, with success, the work of the two great humorists Thackeray and Dickens. Author of many books, including: *Confessions of a Caricaturist*, 1901; and *Harry Furniss at Home*, 1903. One of the best lecturers and raconteurs of the day, he latterly wrote plays for reproduction on the cinematograph, and played the leading part in each of them. Died at Hastings, Jan. 14.

Furniture (from Fr. *fournir*, to furnish) includes all goods, fittings, vessels, every movable, in short, supplied to buildings to adapt them to their use. Until the Renaissance days, household appliances were few and a luxury to their possessors. Indeed, the peoples of antiquity were satisfied with a bed, a table, a couch, and sometimes a chair, for the best hours of their lives were spent out of doors and sedentary pastimes were few. Up to Roman times the woods most commonly used for domestic plenishings were first of all cedar, and then rosewood, ebony, teak, pine, and walnut, whilst bronze and electrum, and the precious metals, silver and gold, and ivory, were more freely used for F. than they are to-day; under the empire wealthy Romans had golden cooking utensils. Still, wood has always been the basis of F., and that being so, it is not surprising that few examples of early work have lasted to our day. The chief sources of information about Assyrian and Egyptian household fittings, and likewise about those of Greece and Rome, are various sculptures and mural decorations and paintings. The cabinet-

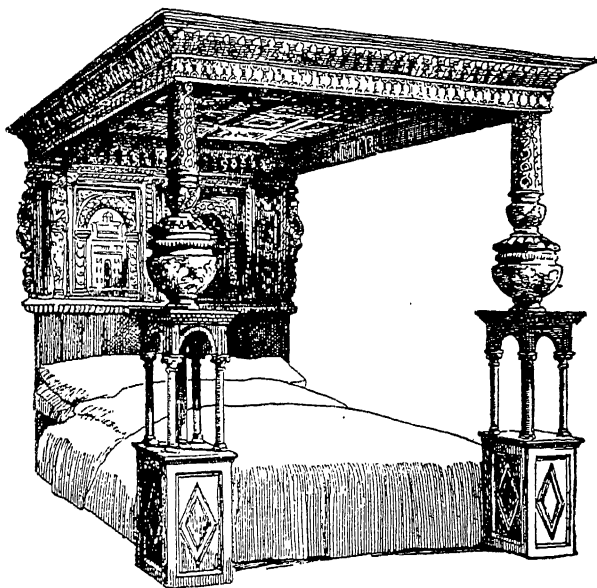
makers of Nineveh, as also of Thebes and Memphis, knew how to embellish their couches and tables with inlayings of ivory, and were fond of supporting their chairs and thrones on legs of wild animals; bulls, lions, and rams were favourite devices for carving, and slaves, usually captives in war, were often degraded to the position of upholding some portion of the regal throne. The Greeks derived their mobiliary fashions from the E., and the plutocrats of Rome patronised Greek in preference to native workmen. Folding chairs, chairs with sloping and upright backs, elaborate footstools, bronze tripods, armchairs with sphinxes for elbow rests, splendid marble tables and canelabra, oriental couches and all manner of bronze work damascened in gold and silver were common appendages in the palaces and sumptuous homes of the kings and aristocrats of classical antiquity. Roman fashions were copied by Byzantine craftsmen, and under Charlemagne there flourished the Rheno-Byzantine school of art, whose best work appears in their magnificent enamelled shrines and reliquaries. In the Middle Ages beds and chairs were still restricted to the upper classes, but in the castles and manor houses of the Norman barons household appliances were rapidly developing, both in number and artistic worth. Bedsteads were square in frame and roofed with panelled testers supported on carven posts; rich hangings and tapestries and decorated chests of Italian cypress were imported, and other chests and portable presses were made at home with wrought iron clasps and hinges and with inlaid wood or iron strap-work ornament, or sometimes with panels of tempera painting on gilt backgrounds. Chests were used in repositories for money and valuables, and also for ecclesiastical vestments. When the family removed they served as trunks for all forms of apparel and costly fabrics, usually stored in massive wardrobes or *armoires*. It is, of course, from the chest that the modern *dressoir*, or sideboard, has developed.

Before passing on to the Renaissance one word must be said of Saracenic work. Omitting what they did for the interior of churches, the Saracens deserve every praise for the beauty and delicacy of their lattice work, and for their skill in inlaying, whether with silver iligree, brass, ivory, or mother-of-pearl. These merits are well illustrated by their tall hexagonal tables and cross-legged reading desks. After the great revival, artisans no longer carved episodes from the

cycles of romance or the legends of their saints; for these were swept away by the classical mythology which men so eagerly absorbed. During the Quattrocento period in Italy (1400-1500), sumptuous F. of every description was executed at the bidding of the Medici and other patron princes. Gilt grounds, *pietra dura* work, that is, the inlaying of slabs of coloured and richly veined marbles, and *tarsia*, or *certosina* work, or inlaying of wood in geometrical

although it was overshadowed by the great *floraison* in F., which marks the eighteenth century throughout Western Europe. Like the famous 'Great Bed of Ware' of Elizabethan days, it is very solid and very heavy, both in design and in the thickness of the oak or chestnut which were the favourite woods, yet these qualities recommend themselves to many, and undoubtedly suggest a simplicity and strength absent from later work.

In this country the heyday of cabi-



THE GREAT BED OF WARE

It is about 12 ft. square, and will provide sleeping space for a dozen persons. It was acquired for the Victoria and Albert Museum in 1931.

patterns or floral designs came quickly into vogue and spread rapidly across the Alps to other countries. During the reign of Henry VIII. Jean de Mabuse and Holbein introduced Italian fashions into England, and in France, as the result of the infiltration of Italian craftsmen, a mass of heavy and rich F. was made, but the frequent use of strap-work and the cartouche, which characterises the Henri-Deux style, is peculiarly French.

The so-called Jacobean style undoubtedly has its attractions,

net-making is associated with the names of Chippendale, Sheraton, and Adam, who raised the manufacture of F. to an art, to which they freely gave their talent both for execution and design. Their inspiration was clearly drawn from the French artist, Boulle, who owed his excellence in marquetry work to Florentine and Venetian craftsmen. These men had already shown the scope and beauty of the art. But marquetry did not originate in Italy: its home was the East, Damascus, Persia, and India, and thence it passed to Europe by way

of the great trade routes. Boulle belongs to the Louis Quatorze period—the armoire in the Jones collection at S. Kensington is a beautiful illustration of his work—but though this period and the succeeding ones the Regency and the Louis Quinze or Rococo afford much that is both sumptuous and elegant, the cabinet-maker's art reaches its high-water mark just before the Revolution, that is, in the reign of Louis Seize. In the S. Kensington Museum may be seen some splendid specimens of the exquisitely finished and truly choice work of David, Riesner, and Gouthière, who enjoyed the patronage of Marie Antoinette. Gouthière was the first founder and chaser of his day, and used to mount in ormolu or bronze-gilt the elegant commodés and cabinets which the other two had made. These men turned their backs on the frivolous, rampant vagaries of Meisssonier and the other apostles of the Rococo school, and developed a beautiful restraint and delicacy accentuated by their preference for classic forms. Thus the 'riotous curves' of the Du Barry period gave place to medallions and straight-lined patterns, which heralded a purer, nobler style. But the advent of Napoleon witnessed a backsliding, and F. became tainted with the dry and heavy classicism of the time. The best examples of the 'Empire style' may impress and awe, but despite the richness of their woods—mahogany, satinwood, etc.—they are sadly deficient both in charm and grace. In England after the death of Chippendale, the master of the *soi-disant* 'Chinese style,' and his compeers, there is little to note but a slavish, tasteless imitation of French models. To-day an attempt is being made in *l'art nouveau* to resuscitate a naturalness and simplicity long since passed away. This style is marked by the popularity of various light oaks and may be said to draw all that is good in it from the lectures and teachings of William Morris and his band of fellow-workers. Still it seems at present as if the economic division of labour, the substitution of machinery for hand labour, and the utter divorce of the designer from the artisan have well-nigh killed cabinet-making as an art. The finest collections of old F. are housed in the Louvre, the Victoria and Albert Museum, and Hertford House (the Wallace collection).

The manufacture of American furniture has developed along much the same lines as Eng., but it has been influenced by other European and by Oriental styles in addition. The vogue for collecting 'antiques' in

America leads only to the discovery of very primitive furniture of a strictly utilitarian nature, chiefly for kitchen use. The early colonists naturally designed their furniture on simple lines, and the woods they employed were for the most part pine, maple, oak, and the native nut-woods. Mahogany, rosewood, and black walnut were all greatly favoured in Victorian times. The furniture of the late seventeenth and early eighteenth century showed such characteristic pieces as high-backed chairs, gate-leg and butterfly tables; while in Queen Anne's time appeared sofas, tallboys, lowboys, cupboards, writing-tables, and chests of drawers in both walnut and maple. In the middle of the eighteenth century Chippendale furniture in mahogany became the vogue, and to a somewhat lesser extent, Sheraton, Shearer, Heppelwhite, and Adam. Later on Directoire and Empire styles were used as models for many graceful chairs, sofas, and other pieces of American manufacture. The leading cabinet-makers of early times were established in Philadelphia, with New York as second and Salem as third in importance. In America, as in England to-day, the Cubist style has been developed as a passing novelty, and it has a certain amusing and bizarre charm of its own. See: *An Encyclopædia of Eng. Furniture*, 1927, and *Eng. Furniture* 1928, by O. Brackett; *The Practical Book of Italian, Spanish, and Portuguese Furniture*, by H. D. Eberlein and R. W. Ramsdell, 1927; *Eng. Furniture of the 16th-19th Century*, by Percy Macquoid, 1928; *Eng. Furniture from Charles II. to George II.*, by R. W. Symonds, 1929; *An Outline of Period Furniture*, by K. M. Kahle, 1929; *The Period Furniture Book*, by G. G. and F. Gould, 1929; *Old Eng. Furniture for the Small Collector*, by J. P. Blake, and A. E. R. Hopkins, 1930; also *Colonial Furniture in America*, by L. V. Lockwood, 1902; *Furniture of the Pilgrim Century*, by Wallace Nutting, 1921; *American Furniture and Decoration*, by E. S. Holloway, 1928; *Knowing, Collecting, and Restoring Early American Furniture*, by H. H. Taylor, 1930.

Furniture Cream, a mixture used for polishing chairs and sideboards, etc. Beeswax and resin are dissolved in heated turpentine and then mixed with a solution of powdered soap and carbonate of potash. When applied to wooden surfaces, the oil dissolves the former polish and the other constituents make a new one.

Furnivall, Frederick James (1825-1910), an English philologist and editor, was called to the Bar in 1849,

but his serious thoughts were soon diverted from law to literary studies. By nature he was an enthusiast, and this explains how he succeeded in founding as many as seven learned societies for the promotion of literary appreciation and for the publication of texts. These were the Early English Text Society (1864), the Chaucer (1868), Ballad (1868), New Shakespeare (1874), Browning (1881), Wyclif (1882), and Shelley (1886) Societies. By means of these associations he collected as much as £30,000, which was expended in issuing cheap editions of a number of early texts and rare works of literary merit, which thus became accessible to a large circle of interested students. Many of the texts were edited by F. himself, but his great work as editor was his issue of *A Six-text Print of Chaucer's Canterbury Tales* (1868-75), which was an exact replica of six original MSS. F. further supervised the publication of a series of facsimiles of the quartos of Shakespeare's plays, and for some years was editor of the *Oxford New English Dictionary*, later under the care of Dr. Murray. Besides his earnest and unremitting labour in the literary field, F. was in his day a splendid oarsman, and in 1885 introduced races for sculling fours and eights. A gratifying testimonial in 1900 proved that his friends appreciated his unselfish and valuable work, and we may add, his kindly, genial disposition.

Furnival's Inn, see INNS OF COURT.

Furruckabad, see FARRUKHABAD.

Furs, pelts or skins which have been specially treated to increase their beauty and keep them from decay. They are obtained for the most part from mammalian animals, which should be killed in winter, as their coats are then finest. At that season the hair is soft and supple and is fairly evenly distributed. F. vary in colour, being black, white, yellow, or a mixture. Moreover, colour is by no means regularly distributed over the body, but may be in stripes or spots, or it may be uniform or dappled. A short description follows of the best-known varieties of F.

Lamb.—The best F. are the Turin skins, which are black and lustrous; they come from Tuscany, Lombardy, and Piedmont.

Astrakhan (the name of a city on the Volga) is taken from still-born lambs, the fleece being made curly by compression.

Rabbit comes chiefly from the silky-haired, slaty-grey variety, which abounds in Normandy and other parts of France, and also from the white Chinese rabbit, which has a soft and brilliant coat.

Wolf.—The finest skins are white or silvery and come either from Labrador or from Siberia. Furriers often sell the skin of the black wolf, which inhabits N. America, as fox. This F. is worth anything from 5s. to £5, and is especially useful for sleigh coats.

Lynx.—A large number of skins are annually imported from Canada, California, and Alaska, and good ones also come from Siberia and Sweden, etc. Lynx is a reddish-grey and is worth from twenty shillings upwards.

Squirrel.—As many as 3,000,000 are collected every year in Russia and Siberia. In these countries the squirrel in winter is a very fine grey; the best come from near the sea of Okotsk; the largest from Nertschinsk.

Bear.—Over 20,000 are shipped yearly from Canada, Alaska, and the United States. Bear, especially the black variety, is a favourite F., as it is thick, glossy, and long. Good F. are obtained from the white polar bear, the brown grizzly and European bear, and the black Chilian, Cordillera, Malay, etc. The range in value is wide.

Fox.—The skins of the 'Blue Fox,' which lives in the Arctic regions, are at their best a deep slate, and fetch from a few shillings to £10 or over. The 'Silver Fox' has a silvery-black coat; it is found in Alaska, Columbia, etc., and its F. is much worn in Russia. The skins of the 'Red Fox,' which inhabits North America and Kamchatka, are bought in great numbers by Turkey. About 40,000 skins of the 'Grey Fox' and 'Kitt Fox' are imported yearly from America. In 1927, there were 3067 fox farms in Canada, with a total of 62,000 foxes, principally silver foxes.

Mole is soft and velvety-brown, but is not in great demand.

Sable is one of the most highly esteemed F. It comes chiefly from Russia and Yakutsk, is worth anything from £10 to over £50 a skin, and varies in colour from umber-brown to black.

Mink is derived from a water animal of Canada and the United States. Its F. is brown (light and dark) and is sometimes as soft as sable. Canada has some 300 farms raising fur-bearing animals other than foxes (*vide supra*) chief among which are mink, racoon, skunk and musk rat.

Marten is soft, durable, and of a warm brown hue. Stone martens are collected in Europe, but the finest martens come from Labrador and E. Maine.

Ermine is perhaps the most beautiful of all F. It is white and comes chiefly from Siberia.

Otter.—The rusty-brown F. of the sea otter, which lives in the Arctic, is

highly prized, and is worth from £20 to £100 a skin.

Seal is rather like otter. Young seals, especially, have soft hair and a fine skin. The Antarctic skins are the best, but those from the Cape and from the Pribylov Islands in the Behring Sea are also much esteemed.

Skunk has recently been manufactured on a larger scale, as the unpleasant smell has to a great extent been overcome. This F. is white or black, or striped, and comes mostly from the United States.

Brown beaver, chinchilla, from Peru—a delicate blue-grey skin—and *musquash* from N. America, are also made up into F.

The *Fur Trade* has been carried on from time immemorial in Asia. In the Middle Ages Italian merchants used to send F. from the East to England, but it was the foundation in 1670 of the Hudson's Bay Company which practically put the control of the Canadian F. trade into English hands. This company is flourishing to-day, the comparatively recent American Fur-sealing Company (1890) being its only serious rival. The North-West Company, which once did considerable traffic in F., has been wound up for many years, and the Skinners' Company, a City of London guild, has long since waived its fur-trading privileges. During the Great War, the fur market of the world, long centred in London, changed to the U.S.A. More recently, however, the English market has shown a tendency again to take a large proportion of Canada's exports of raw furs. The latest figures (1929) show that of the undressed furs exported to England and the U.S.A., ten million dollars' worth went to England and 12,800,000 dollars' worth to the U.S.A. As a result of the changed situation, Montreal has become an international fur market.

Fur Dressing and Dyeing.—Before the skins reach the furrier they have been dried in the sun. In his hands a pelt receives very elaborate treatment before it is ready to be made up and sold. First it is thoroughly softened with salt solution, the operation lasting for ten days: then it is 'fleshed,' that is scraped free of any fat or flesh which still adheres. If the hairs of the skin stick together because of the presence of some glutinous substance, the latter is removed with olive oil. The pelt is next sewn up into a pouch with the hair inside, rubbed with butter or pork fat ('dubbing'), and then 'stocked.' The object of 'stocking' is to work in the fat and render the skin supple; this is usually achieved by some three hours' trampling. The skin is then unsewn,

softened, freed from superfluous grease and finally trimmed.

Dyeing is much more freely practised now than it was a few years ago. White furs may be bleached and cleaned by sulphur, hyposulphite of soda, essential oils, and hydrogen peroxide, etc. It is difficult to discover how the large firms dye their furs black, chestnut, and fawn, because they find it profitable to observe the utmost secrecy as to their processes. The old recipes were very complicated, and without any scientific basis, but these have been greatly improved upon since the chemistry of dyeing and the function of mordants have been better understood. Many devices have been invented for working up cheaper F. in imitation of the more expensive. 'Marking and spotting' are commonly practised, and recently the aid of electricity has been sought to turn out artificial seal.

Furse, Charles Wellington (1868–1904), an Eng. painter, b. at Staines, son of Rev. C. W. Furse. In 1884 he entered the Slade School and won the scholarship in 1885; from here he went to study at Julien's studio in Paris. His first exhibition in the Royal Academy was a vigorous picture called 'Cain,' 1888. In 1900 he married Katherine, daughter of John Addington Symonds. All his pictures are free from restraint, especially those whose subjects are of outdoor life, such as 'Diana of the Uplands,' which breathes of the fresh wind. He was a great supporter of the New English Art Club. Many of his works show a tendency to be decorative, and his mural decorations for the town hall at Liverpool are excellent both in composition and proportion. Among his other pictures are 'The Return from the Ride,' 'The Lilac Gown,' 'Cubbing with the York and Ainsty,' etc. His early death was a serious loss to British Art.

Furse, Dame Katharine (b. 1875). Founder and commandant-in-chief of the V.A.D., daughter of John Addington Symonds (q.v.). Went to France in the Great War in Sept. 1914, and started V.A.D. work in that theatre of operations, afterwards returning to England to organise the V.A.D. department under the Red Cross Society. Director of the World Bureau Girl Guides and Girl Scouts.

Fur Seal, or *Sea Bear*, belongs to the Otariidæ, or sea-lions, as opposed to the Phocidæ, or true seals. Fur-seals are divided into N. and S. herds, the latter of which are almost extinct. But the *Otaria ursina* of the N. Pacific, especially of the Commander and Pribylov Islands in the Behring Sea, are still comparatively plentiful.

These islands were leased by the U.S.A. to the Alaska Commercial Co. (1870-90), and afterwards to the N. American Commercial Co., whose monopoly, however, expired in 1910. The adult bull is 6 ft. long, with a girth of 4½ ft. In its seventh year it weighs about 450 lb. Its fur is dark brown, but that of the female, which is much smaller and weighs only 80 lb., is often fairly light. Seals feed in deep water chiefly on a small fish rather like smelt, and on Alaska pollack and squid. Their breeding-grounds are the rock-strewn island shores. The bulls arrive in May and the cows in June, the pup is born soon after the cow's arrival, and by the winter time (November) is ready to swim away with its mother, the bulls having already (in August) gone to sea to feed. In their winter migrations the Commander seals penetrate to the latitude of S. Japan, and the Pribylov as far as S. California. It is the custom of the young bachelor seals to sleep away from the 'rookeries.' Those who hunt them for their fur surround them in gangs by night, and drive them inland to the killing ground, where they knock them down with clubs. This method of trapping has been superseded by 'pelagic sealing,' that is, pursuit in open waters with spear or shot gun. Pelagic hunters, however, have killed male and female indiscriminately, with the result that the species is fast dying out. Various commissions have tried to remedy this abuse. Land-sealing on the Pribylov and Commander Islands from 1868 to 1897 resulted in a catch of 3,382,949 and pelagic sealing of 963,529. In 1906 the catch was 15,000.

Fürst, Julius (1805-73), a Ger. Orientalist, b. at Zerkowo. He was of Jewish descent, and many of his works are Judaic in character. He published a considerable number of works on Oriental languages and literature, including the famous *Bibliotheca Judaica*, 1849-63; *Concordantiae Vcteris, Testamenti Hebraice et Chaldaice*, 1837-40, an English translation of which appeared in 1871; and *Kultur- und Literaturgeschichte der Juden in Asien*, vol. i. 1849.

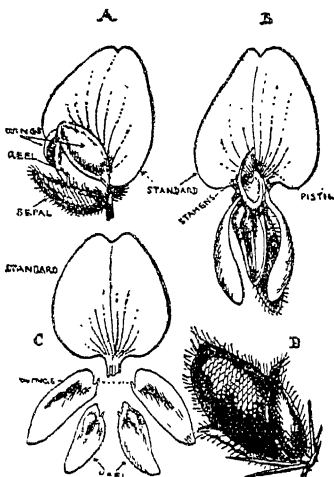
Fürstenberg, a tn. of Brandenburg, Prussia, situated about 60 m. E.S.E. of Berlin. Pop. 6382.

Fürstenwalde, a tn. of Brandenburg, Prussia, situated on the Spree, about 21 m. W. of Frankfurt-on-Oder. It manufactures machinery, gas and electric light fittings, and has breweries. Pop. 23,000.

Furth, a tn. of Bavaria, situated near the Bohemian frontier, about 40 m. N.E. of Ratisbon. Its chief

industries are the manufacture of glass and toys. Pop. about 6100.

Fürth, a tn. in the prov. of Middle Franconia, Bavaria, situated about 5 m. N.W. of Nuremberg at the junction of the Regnitz and Pegnitz. Its manufactures, which are similar to those of Nuremberg, include mirrors, toys, gold leaf, pencils, optical instruments, furniture, and chicory. The first steam railway in Germany was between F. and Nuremberg, opened in 1835. Pop. about 73,000.



FURZE

A, flower before fertilisation; B, flower after fertilisation by bee; C, petals of flower, D, fruit (pod).

Further India, see INDO-CHINA.

Fur Tribe, see DARFUR.

Furtwängler, Adolf (1853-1907), Ger. archaeologist; b. June 30, at Freiburg-im-Breisgau. Took part, 1878-79 in excavations in Olympia. Assistant in Berlin museums, 1880; professor and keeper of antique records, in Munich, 1894. In 1901-7 undertook excavations in Ægina, Amyklä, and Orchomenos. Wrote: *Meisterwerke der griech. Plastik*, 1893; *Die antiken Gemmen*, 1900; etc. Died Athens Oct. 11.

Furtwängler, Wilhelm, Ger. musical conductor; b. Jan. 25, 1886, in Berlin; son of Adolf (q.v.). Studied in Munich; was in the court theatre under Mottl, 1911-15. Conducted opera in Munich, and 1915-19 in Mannheim.

Conducted, 1920-22, symphony concerts of Berlin state orchestra, and Frankfort museum concerts; and, 1922-27 (as successor to Nikisch), Leipzig Gewandhaus concerts. Conductor of concerts of Gesellschaft der Musikfreunde, Vienna, 1921-30; of Berlin Philharmonic concerts since 1922. Conducted at Philharmonic concerts, New York, 1926-27. Since Nikisch's death, chief Ger. conductor.

Furze, the name given to several species of the leguminous genus *Ulex*, which occurs in Europe and Africa. There are three species known in Britain, *U. nanus*, *U. Gallii*, and *U. Europæus*, and they are called also whin and gorse. They are all bushy shrubs with reduced leaves and many reduced branches; the bright yellow flowers make gay the bare heaths from early summer. The fruit has a curious explosive mechanism.

Fusan, or **Pusan**, an important seaport on the south-eastern shore of Korea, and is the terminus of the railway from Seoul. This treaty port was opened to Japanese trade in 1876 and later on to foreign trade generally. The town consists of two parts, the native part and the Japanese settlement, which is the new part. The chief exports are rice, beans, hides, and silks, while cotton goods and Japanese goods are imported. The fisheries are also of some importance. It has a good harbour. Pop. about 60,000.

Fusaro, **Lake of**, a lake of Italy, situated about 11 m. W. of Naples, It is the Acherusia Palus of Roman times, and is near the ruins of Cumæ. It is also famous for oysters.

Fuse, or **Fuze** (1) a contrivance for igniting the explosive element in a shell or blasting cartridge at the required moment. A F. may be required to be instantaneous, or it may be designed to delay the explosion. Fs. used for blasting purposes are either slow-burning or electrical. In the former case a cylindrical packing of linen with a core of gunpowder is used. As ordinarily prepared, this burns at the rate of about 2 ft. per minute, and takes effect on the detonating cap which then explodes the main charge. An electrical F. is constituted by inserting the ends of two insulated copper wires in the detonating cap. The wires are then attached to long wires leading to a battery deposited some distance from the scene of the explosion. Fs. for service shells are either percussion or time Fs. Percussion Fs. are actuated either by the pressure of the gases behind the shell, or by the rotation induced by the rifling, or by the impact of the shell when it reaches its destination.

Where the F. is actuated by the forces acting upon the shell at the moment of discharge, it means that a needle is set free or unlocked, so that it causes the explosion of the detonator when the shell strikes. If the F. is operated by direct impact only, it must necessarily be of sufficient strength to prevent explosion at the discharge of the gun. Time Fs. were formerly made of wood; their action depends upon two channels of slow-burning F. composition which is ignited by the discharge of the gun: these channels are movable with respect to each other, so that the distance from the point of first ignition to the magazine may be adjusted, thus determining the time to elapse before the explosion of the shell. (2) in electricity, a thin wire (usually made of copper but sometimes of tin or an alloy) inserted in an electric circuit from considerations of safety. If the current in the circuit is too large, the F. wire becomes hot and melts, thus breaking the circuit and preventing the flow of the current. Fs. are mounted in insulating holders of porcelain, glass, or the like. For larger currents they are replaced by circuit breakers which work magnetically.

Fusee or **Fuzee**, see HOROLOGY.

Fusel (or **Fousel**) **Oil**, also called **Potato Spirit**, consists chiefly of amyl alcohol ($C_5H_{11}O$), but with it are also mixed butyl and propyl alcohol. It is a colourless fluid with an oppressive smell and a burning taste. Commercially, it is used for making pear drops, and other forms of amyl acetate for flavouring purposes, patent varnishes, and essential oils. When potatoes, rye, and barley are fermented and the liquor distilled, it will usually be found to contain F. O., which becomes gaseous at a higher temperature than either alcohol or water. It is a constituent of most inferior spirits, but is not poisonous, though it produces undesirable physiological effects.

Fuseli, **Henry**, or **Fuessli**, **Johann Heinrich** (1742-1825), an artist and writer, b. at Zürich. He studied art in Italy, and then took up his residence in London, where he was known by the name of Henry Fuseli. He was elected R.A. in 1790, and about 1798 became a professor of painting at the Academy. His pictures, which testify to his wonderful imagination, are somewhat lacking in their method of execution. He painted 'The Nightmare,' and illustrations for both Shakespeare's and Milton's poetry. He wrote *Lectures on Painting*, 1801-20.

Fushiki, or **Fushigi**, a seaport of Japan, on the W. coast of Honshiu,

about 32 m. N.E. of Kanazawa. It has been an open port since 1889. Pop. about 20,000.

Fushimi, a tn. of Honshiu, Japan, about 6 m. S.E. of Kioto. Here was fought a battle between the imperialists and the followers of Shogun in 1868. Pop. about 22,000.

Fusible Metal, a general term applied to certain bismuth alloys which have a particularly low melting point. The chief varieties are: (1) Newton's metal, containing 8 parts of bismuth, 5 of lead, and 3 of zinc; melting point 95° C. (2) Darcel's metal, containing 2 parts of bismuth, 1 of lead, and 1 of tin; melting point 94° C. (3) Rose's metal, containing 25 parts of bismuth, 14 of lead, and 12 of tin; melting point 94° C. (4) Wood's metal, containing 4 parts of bismuth, 2 of lead, 1 of tin, and 1 of cadmium; melting point, 67° C. A useful property of these alloys is that they expand on cooling, and therefore give a sharp definition when used for stereotyping, etc. Such metals are also used as safety plugs in steam-boilers, when, if the water level falls too low, they are melted and act as a safety valve.

Fusiliers, originally soldiers armed with a 'fusil' or lighter musket than the rest of the infantry. As all British regiments now carry rifles of one pattern, the term F. has only an historic significance. *See also* under the names of the various regiments: LANCASHIRE FUSILIERS, ROYAL FUSILIERS; SCOTS FUSILIERS, ROYAL; WELCH FUSILIERS, ROYAL, etc.

Fusi-Yama, or **Fuji-Yama**, *see* FUJI SAN.

Fustel de Coulanges, **Numa Denis** (1830-89), a French historian, born in Paris. He was professor at Amiens, Paris, and Strasburg, etc.; in 1870 was appointed to the Ecole Normale, Paris, and afterwards became a professor at the Sorbonne. His most famous work is *La Cité Antique*, 1864 (translated into English, 1874). Other works are: *Histoire des Institutions Politiques de l'Ancienne France*, 1875-92; *La Gaule Romaine*, 1888-91; *Nouvelles Recherches sur quelques problèmes d'Histoire*, 1891; *Questions Historiques*, 1893. *See* Paul Giraud's *Fustel de Coulanges*, 1896.

Fustian, a cotton fabric. The name is an old one, said to be derived from El-Fustat in Cairo. During the Middle Ages women's apparel and priest's vestments were made of F., but to-day the material is commonly used for labourers' clothes. It is the cotton equivalent of silken velvet, and is variously known as velveteen, corduroy, and moleskin. Jean, which is a thick tweeled, or twilled, cotton

cloth, is one kind of F., and corresponds to satin in silk stuffs. F. is dyed many colours, mostly dark.

Fustic, the name of two dyestuffs. 'Old F.' is the wood of the *Maclura tinctoria*, a tree indigenous to the W. Indies and Brazil. The dye from it is yellow, and was widely used before the introduction of aniline dyes for animal fibres, especially wool. 'Young F.' is the wood of the smoke plant, *Rhus cotinus*; as a dye, the yellow colour derived from it is very fugitive to light, but it is much employed in tanning operations.

Futa-Jallon, a dist. of French Guinea, W. Africa, having an area of about 42,500 sq. m. It stands at an elevation of about 4000 ft., with beautiful scenery and a pleasant climate. The chief productions are cattle, gold and other metals, rice, and cotton. Its chief rivers are the Senegal and Gambia, both of which rise here, while the capital is Timbo and Tuba the largest city. Pop. about 700,000.

Futa-Toro, a territory of W. Africa in the northern portion of French Senegal. It produces large quantities of pig-iron and tamarinds. Pop. about 120,000.

Futehgunge, *see* FATEHGANJ.

Futhorc, *see* RUNES.

Futehghur, or **Fatehgarh**, a tn. on the r. b. of the Ganges in the dist. of Farukhabad, British India. With the town Farukhabad it forms a joint municipality, and is not only the civil capital but also a manufacturing centre for cotton prints, gold lace, tents, and metal utensils. It has also a government gun-carriage factory and a military cantonment. During the Mutiny (1857) more than 200 of the European residents were massacred. Pop. 67,338.

Futtipoor, or **Futehpur**, a tn. in the plain of the Ganges, British India. It is the cap. of a dist. in the United Provinces of Agra and Oudh. It is situated 48 m. by rail S.E. of Cawnpore. It has many fine public buildings, and is especially noteworthy for the very beautiful mosque which it possesses. Pop. about 15,000.

Futurism. This movement was founded in 1909 by the Italian poet, Filippo Tommaso Marinetti, and spread to art and music as well as to letters. In 1911 Marinetti published his work *Le Futurisme*, and in Feb. of that year he arranged an exhibition of the work of five Italian painters in the galerie Bernheimjeune in Paris. These artists, Umberto Boccioni, Carlo D. Carra, Luigi Russolo, Giacomo Balla, and Gino Severini, issued a 'profession of faith,' in which they stated that they were young and their art was of a

violently revolutionary nature; they expressed their strong hatred of the academic in art, and showed that their aim was to portray movement. Painting and sensation, they declared, were inseparable words, and that 'what must be rendered is *dynamic sensation*—that is to say, the particular rhythm of each object, its inclination, its movement, its interior force . . . we thus arrive at what we call painting of states of mind (*la peinture des états d'âme*).' In the summer of 1913 (June 20 to July 16), Boccioni organised an exhibition of his own works, his paintings and sculptures; but in later years he developed a different and more intelligible style, which showed him as a sculptor of note. The Great War came at an inopportune time for F., and it is now

looked upon as a passing phase in the development of modern art. In 1920 Marinetti issued *I Manifesti del futurismo* in four vols. in Milan. See G. Coquiot's *Cubistes, Futuristes, Passéistes*, 1914.

Fuze, see FUSE.

Fuzuli (d. 1562), a Turkish prose writer, see TURKEY—*Literature*.

Fyen, the second largest island of Denmark, see FÜNEN.

Fyne, Loch, an inlet of the sea in Argyllshire, Scotland, extending in a northerly and north-easterly direction from the Sound of Bute, some six miles beyond Inveraray, having the district of Cantire on the W. and Cowal on the E. On its W., also, is Loch Gilp, and the town of Inveraray is on this side of the loch. It is famous for its herrings.

Fyzabad, see FAIZABAD.

G, the seventh letter of the English alphabet. In Latin **G** was a voiced guttural stop, which at a later period was palatalised before front vowels. Old English **G** may be considered under three headings: (1) As an *explosive* or *stop*. It was a voiced guttural stop in the forms, *ng*, *gg*, developing into hard *g*: cf. O.E. *singan*, *frogge*, N.E. *sing*, *frog*. When *ng*, *gg* was followed by *i* or *j*, it was a voiced palatal stop, developing into the sound *dje*; cf. O.E. *sengean*, *ecge*; N.E. *singe*, *edge*. (2) As a *spirant*, **G** was a voiced guttural spirant initially when followed by an original guttural vowel (*a*, *o*, *u*) or by a consonant, and medially when following an original guttural vowel or a consonant. Initially it developed into N.E. hard *g*, except before *n*, when it became silent; cf. O.E. *gōs*, *gripan*, *gnagan*; N.E. *goose*, to grip, to gnaw. Medially it became palatalised; cf. O.E. *burga*, M.E. *burve*, N.E. *borough*. Finally **G** was a voiceless guttural spirant when following a guttural vowel or consonant, and often was vocalised to *h*. It is present in N.E., but is silent or pronounced as an *f*; cf. O.E. *hēah*, N.E. *high*; and O.E. *genōg*, *genōh*, N.E. *enough*. Initially before, and medially and finally after, an original palatal vowel **G** was a voiced palatal spirant. Initially, it developed into N.E. *y*, otherwise becoming vocalised to *i*; cf. O.E. *zieldan*, *daeg*; N.E. *yield*, *day*. (3) Old English **G** also represented the Germanic *j*, and as such was always a palatal spirant, represented in N.E. as *y*; cf. O.E. *geong*, *gēa*; N.E. *young*, *yea*. The M.E. symbol *z*, used through French influence, was used much later in Scotland than in England, and may still be noted in such words as *capercaillie*, *Menzies*. To the forms of N.E. **G** already noted may be added the hard *g* before *e*, *i* in words of Teutonic origin, e.g. *give*, *get*, and in Hebrew proper names, *Gideon*, *Gehenna*. As an initial preceding *n*, **G** has become silent, and *gn* is sounded in many words of French origin as *sign*, *feign*. It may or may not be pronounced hard medially, e.g. *singer*, *younger*.

G, in music is the fifth tone of the natural diatonic scale of C.

Gaba Tepe, headland on the E. end of the Gallipoli peninsula in Turkey, between Suvla and Krithia. The beaches in the vicinity are suitable for the disembarkation of troops in considerable numbers, and during the Great War the Australian and New Zealand Army Corps, under the command of General Birdwood, landed just N. of the headland on April 25, 1915. The Turks attacked heavily in this locality, but failed to move the British, who, however, made little progress, and finally withdrew in the following Dec. (See GALLIPOLI CAMPAIGN.)

Gabbro, a group of basic igneous (plutonic) rocks. They have a completely crystalline granitoid texture, and usually occur in association with the crystalline schists as large amorphous masses or bosses. The chief mineral constituents are plagioclase, generally a soda-lime or lime feldspar—labradorite being the commonest, though anorthite is often present in abundance—together with hornblende, augite, magnetite, and sometimes olivine. Apatite is almost invariably present. Generally the feldspar is embedded in great crystals of augite which have evidently developed last of all. The composition of these rocks shows from 45 per cent. to 55 per cent. of silica, and a large proportion of lime and magnesia. The proportion of alkalis is small. There are **G.** areas in Cornwall, in Ayrshire, in Mull, and in Skye, and they occur usually in a somewhat central position surrounded by masses of basic lava, such as basalt. The composition of **G.** bears a very close resemblance to that of dolerite.

Gabelle (Low Lat. *gabulum*, a tax), a term applied in France to a tax on various articles, but more particularly to the tax on salt. It was first levied by Philippe IV. in 1286, and was made permanent by Charles V. It compelled all above the age of eight to purchase, every week, a fixed quantity of salt at a set price. It was always most unpopular, and was finally abolished about 1789.

Gabelsberger, Franz Xaver (1789-1849), an inventor of a German system of shorthand, *b.* at Munich. The formation of his signs in shorthand corresponded as far as possible with the written characters of the German alphabet, and his method is still used to report the proceedings of parliament in German-speaking countries.

Gaberlunzie, an old Scottish name for a beggar, who was so called from his wallet. Scott's *Edie Ochiltree* in the *Antiquary* is a good example of the professional beggar.

Gabes, *see* **CABES**.

Gabii, an ancient tn. of Latium, situated on the Via Gabina, about 12 m. from Rome. It played an important part in the expulsion of the Tarquins. It was famous for its baths, and the Emperor Hadrian built a senate house (Curia) and an aqueduct there.

Gabinus, Aulus, one of the Roman tribunes in 67 B.C. He was a defendant of Pompey, and it was through him that Pompey secured his 'extraordinary' command in the E. He proposed that a magistrate should be appointed who should be absolute master in all maritime affairs of Rome. The measure was supported by Cæsar in opposition to the senate, and carried. In 58 B.C. he was consul, and supported the tribune Clodius in his free distribution of corn. He was made governor of Syria in consequence, and in 55 B.C. restored, on his own responsibility, Ptolemy Auletes to the throne of Egypt, receiving for this a bribe of 10,000 talents. In 54 B.C. he was condemned for provincial misgovernment. In 49 B.C., at the outbreak of the Civil War, he supported Cæsar against Pompey.

Gabirol, *see* **AVICEBRON**.

Gablonz, a tn. of Austria, situated in the N. of Bohemia, about 7 m. S.E. of Reichenberg. It is famous for its trade in glass and artificial gems. It also has textile industries, paper mills and printing establishments. Pop. 30,000.

Gaboon, or **Gabun**, a dist. on the W. coast of Africa, which forms part of French Equatorial Africa. It was discovered by Spaniards in the fifteenth century and received its name from its fancied resemblance to a cabin. The French first settled there about 1842. It has an area of about 173,500 sq. m., and its chief rivers are the Ogowe and the G. The surface is flat by the coast, but behind this rises to a plateau at a height of 3000 ft. The climate of the coast is unhealthy, that of the plateau is better. The natives grow manioc, bananas, nuts, and tobacco, while the Europeans culti-

vate coffee, cocoa and vanilla. The chief exports are coffee, india-rubber, ivory, and palm oil and nuts. Pop. 390,000. Cap. Libreville.

Gaboriau, Emile (1835-73), a Fr. writer of detective novels, was *b.* at Saujon. He began by writing for the Parisian papers and became famous at once when his story *L'Affaire Lerouge* was published in 1866 in *Le Pays*. He quickly wrote others: *Le Crime d'Orval*, 1868; *Monsieur Lecocq*, 1869; *Les Esclaves de Paris*, 1869; *La Vie Infernale*, 1870; *L'Argent des Autres*, 1874.

Gabriel (Hebrew, 'man of God'), the archangel who explained to Daniel the vision of the ram and the he-goat, who appeared to Zacharias to announce the birth of John the Baptist, and to the Blessed Virgin to announce the birth of Christ. He is called archangel by both Jewish and Christian writers and is mentioned in the Book of Enoch as the one who is set over 'all the powers.' The Targum assigns to him the destruction of the host of Sennacherib, and in the Koran his special work is divine revelation. Indeed he is still given the titles of 'Holy Spirit' and 'Spirit of Truth' by the Mohammedans.

Gabun, *see* **GABOON**.

Gad, the seventh son of Jacob by Zilpah, the handmaid of Leah and founder of the Israelitish tribe which is described in Genesis as a 'plundering troop.' When the Israelites left Egypt they settled to the E. of Jordan close to the district inhabited by the tribe of Reuben, their territory including Gilcad. They have a character for bravery, eleven of the tribe of G. came to the assistance of David when he most needed help. G. is also the name of a seer of King David, as well as of the god of luck or fortune.

Gadag, or **Garag**, an important railway centre and manufacturing tn., 42 m. E. by S. of Dharwar, in the dist. of Dharwar, Bombay, British India. Pop. about 41,000.

Gadames, or **Ghadames**, a tn. and oasis in N. Africa situated on the N. border of the Sahara, about 300 m. from Tripoli. The town had its origin from the hot spring which probably made the Roms. visit it about 20 B.C., when it was captured by Balbus and called Cydamus. It is important for its caravan trade, and its gardens produce apricots, dates, and figs. The inhabitants are chiefly Arabs and Berbers. Pop. about 7500.

Gadara, an anct. tn. of Syria, situated to the S.E. of the sea of Galilee, and one of the Decapolis cities. It was originally a Gk. city, but is said to have been captured by Antiochus of Syria in 218 B.C. Some years after it was besieged and partly destroyed

by Jannæus, but it was restored by Pompey about 63 B.C. It is now in ruins. Its coins bear Gk. legends and inscriptions; from which fact it is probable that the wealthy classes were Gks. It was famous for its hot sulphur springs which still exist. The destruction of the Gadarene swine took place probably at Kersa on the eastern shore of Galilee and not here.

Gaddi, a family of artists :—

Gaddo Gaddi (c. 1260–1332), a painter, was b. in Florence. He was a friend of Cimabue, whose influence is seen in the 'Coronation of the Virgin with Saints and Angels,' a mosaic in the cathedral at Florence which is said to have been executed by him. Other works assigned to him are the mosaics in Santa Maria Maggiore, and those in the choir of St. Peter's at Rome.

Taddeo Gaddi (1300–66), a son of the former and a student of Giotto, was also b. at Florence. He painted in fresco the 'Virgin and Child between four Prophets' in the Baron-



TADDEO GADDI

celli Chapel in Santa Croce at Florence, as well as 'Scenes from the life of the Virgin,' besides other frescoes at Pisa, Naples, and Berlin. His pictures are vigorous, but somewhat lacking in imagination.

Agnolo Gaddi (c. 1333–96), a son of Taddeo, was b. at Florence, and studied under Giovanni da Milano and Jacopo del Casentino. His first work was probably the 'Resurrection of Lazarus' in the church of San Jacopo tra' Fosse at Florence. Other

works of his are the frescoes at Prato, representing the two legends of the Virgin and the Sacred Girdle (these are still to be seen though much damaged), and the legend of the Cross, a work in the choir of Santa Croce, Florence, consisting of eight frescoes.

Gade, Niels Wilhelm (1817–90), a Danish musician, was b. at Copenhagen. His *Echoes of Ossian*, 1841, first brought him before the public, the composition was well received, and the king gave him a stipend which enabled him to go to Leipzig. Here he became acquainted with Mendelssohn, and on his death became chief conductor of the Gewandhaus concerts. In 1848 he returned to Copenhagen and founded, some years later, with the composer J. P. E. Hartmann, the musical conservatorium. His compositions include orchestral music, e.g. his eight symphonies which are estimated his best work, cantatas, e.g. *The Erl-King's Daughter*, *Psyche*, *Spring Message*, *Spring Fantasy*, pieces for the piano and pieces for the strings. He was probably one of the founders of the Danish school of music.

Gades, see CADIZ.

Gadidae, a family of fish called technically Malacopterygions, or bony fish. The codfish, or *Gadus*, is a member of this family. Other fish which belong to this family are the haddock and the whiting, both of which form valuable foods.

Gadolinium, a metallic element of atomic number 64 and atomic weight 157.3. It belongs to the group of rare-earth metals, from which it may be isolated by the fractional crystallisation of their nitrates and bromates. Its salts are colourless and it forms a white oxide. Its symbol is Gd.

Gadsden: (1) A co. in the N. of Florida; pop. 29,890. (2) A tn. in Alabama, cap. of co. Etowah. It is 60 m. N.E. of the town of Birmingham, and has cotton manufs., blast furnaces, and pipe works. Pop. 24,042. (3) A vil. of S. Carolina. (4) A vil. of Crockett co., Tennessee.

Gadsden, James (1788–1858), an American diplomatist, was the grandson of Christopher G., and was b. at Charleston, S. Carolina. He entered the army and fought in the war of 1812, as also with Stonewall Jackson against the Seminole Indians. He afterwards became American minister in Mexico and purchased by treaty in that capacity part of the states of Arizona and New Mexico. His diplomatic career was very successful.

Gads Hill, a short distance outside the tn. of Rochester. It forms the scene of the adventures of Falstaff and Prince Henry, as depicted in Shakespeare's *Henry IV*. It is of

more recent interest as the residence of Charles Dickens. He had always coveted the house known as Gads Place, and purchased it in 1856. He lived here between 1860 and his death in 1870.

Gadwall, a species of duck. It is practically unknown in Britain although it has been known to exist in the marshes of Norfolk. It is, however, found practically all over the world, existing in N. Africa, Asia, America, and in all parts of Europe. It is much esteemed as a table luxury, and is for that purpose imported in large quantities into Britain. In size it is not quite so large as the mallard, and it is a freshwater bird. It breeds principally in marshy districts.

Gæa, or **Ge** (Roman *Tellus*), the earth-goddess. She was supposed to be the daughter of Chaos, and the mother of Uranus and Pontus (Earth and Sea). She is also said to have been the mother of the Titans and the Cyclopes. Her cult became extensive in the East, and she was worshipped originally probably at the oracles of Delphi and Olympia. She was also supposed to preside over Death, Hades, and Marriage.

Gaekwar, a title derived from one of the old Mahratta dynasties, and which is held at the present time by the ruler of Baroda. This is one of the old Mahratta states, and is at present feudatory. It is situated in N.W. India.

Gaelic Language and Literature.
Language.—The Gaelic branch of the Celtic language may be said to be confined at the present day to some few thousand people in the Scottish Highlands, the W. of Ireland, the Isle of Man, Wales, and perhaps in parts of Cornwall, but in common parlance is now restricted to the first named. The language of the Scottish Highlanders is familiarly known among the Lowlanders as *Erse*, but the Highlanders themselves are never so named, nor is the name even known among them. They style themselves the *Gadhel*, sometimes written and pronounced *Gael*, and their language, *Gaedhelig*, pronounced *Gaelig*, or nearly Gaelic. But the only name by which the Irish are, or were till recently, known to the Scottish Highlanders is *Gael*. In contradistinction the Scottish Highlanders call themselves *Gael Albinnich*, or the Gael of Albin, and the Irish *Gael Erinnich* or the Gael of Erin. The Welsh call the Irish *Gwyddel*, which is evidently the same as *Gadhel* or *Gael*. It is a matter of topographical and, indeed, philological controversy exactly how the various branches of the Celtic family were disposed in Great Britain and

Gaul in ancient times. It is sometimes assumed that the modern Gaels are a portion of the *Galli*, or Gauls, of the Romans, and the Galatæ of the Gks. But, if so, these names might be taken to be the same as the *Celta* or *Keltai*, sometimes spoken of as a general name for the Gauls. This seems on historical grounds to be erroneous. The Gaels or Goidels of Great Britain and Ireland in Cæsar's time were, with the Brythons (Britons), merely two Aryan races of the Celtic family, while the Ivernians or Hebernians (a word cognate with Erse and Erin) were Turanian, which last fact makes it difficult to understand how Erse and Gaelic came to become practically identified. It is probably largely a matter of mere names, and the identity of tongues is to be accounted for by the close intermingling of the races before the conquering Goidels drove the Ivernians into the W. of Ireland before they themselves were driven westward by the Brythons. All the Gaelic or Celtic tongues as now spoken resemble each other closely in structure, though each has its distinctive features.

It is often asserted that Gaelic, even if once the universal language of the Goidel and Brythonic peoples of Early Britain, has left no trace in modern English, having disappeared with the reputed extermination of the Celts. The best authorities concur in seeing abundant traces. The very idiom 'I am speaking' is Gaelic, and is impossible of an exact rendering in any continental tongue, and the employment of the auxiliary 'do' as an intensive is another common illustration of a distinctive Gaelic idiom, and corresponds to the Gaelic 'dean.' Whether or not Gaelic is doomed to expire as a spoken language, nothing can destroy its imperishable influence on literature. So great an authority as Matthew Arnold declared that rhyme, the most striking characteristic of our modern poetry as distinguished from that of the ancients, is a direct legacy of the Celts, and in this opinion he is confirmed by Zeuss, the most distinguished of Ger. Celtic scholars.

Gaelic itself, or Erse, as spoken in the Highlands of Scotland and in Ireland at the present day, was one branch of the Celtic language, the other being Cymric or Welsh. The former was the common language of the greater part of England before Rom. invasion. It has been objected with much sound criticism that even at the Norman Conquest the great majority of the Eng. people were Celts, and that the stereotyped belief in the virtual

extermination of the Britons, resting as it does on the sole authority of Gildas as echoed by Bede, is really groundless. If this objection is accepted, many philological difficulties disappear, and it is probable that the etymologist Mackay is justified in assuming an unlimited blending of Celt and Saxon reflecting itself in the language, literature, and national character of the hybrid Eng. race. Gaelic prevails largely in the colloquial speech of the Eng. people of to-day, and it underlies the Fr. and Spanish and some parts of the Italian languages. The 'Low Latin' of the Middle Ages, so beloved of law books, is a compound of Gaelic (or other Celtic) words with Latin terminations. Even the word Angle in the race-appellation Anglo-Saxon is a corruption of An Gael, or 'the Gael.' These and similar indications are the best possible refutation of Dr. Johnson's assumption that Erse was the rude speech of a barbarous people, who had few thoughts to express and that, such as it was, it was never a written language. The absence of much in the way of written records of Gaelic is due largely to the ruthless destruction by piratical Danes and Norsemen of all the records, monuments, and manuscripts collected in the sacred Isle of Iona. Irish records met with a better fate, but it seems that Dr. Johnson did not realise, in his strictures on Scottish Gaelic, that Irish and Scottish Gaelic were essentially the same language, with but few more important orthographical differences than the substitution of a dot for the letter *h* in the mode of expressing the aspirate. The forms of the present Irish alphabetical characters are Rom., but otherwise they correspond almost exactly with the alphabet which Cadmus is reputed to have brought to Greece from Phœnicia. The Irish and Scottish Gaelic alphabets contain seventeen letters, against the sixteen of that of Cadmus, the *f* or digamma having been lost to Gk. literature for over 3000 years. The more ancient Gaelic characters of the alphabet, as introduced by St. Patrick, are not markedly dissimilar from those of the modern Gaelic alphabet. The principal difficulty to be met with is in the *r* which is written *ṛ* and in the *s* which is written *ſ*. Gaelic (though not Highland Gaelic) is admittedly a language of immense antiquity, and the Asiatic origin of the Celtic races will account for the relation between it and Assyrian and Egyptian, as evidenced by many of its derivations.

By some etymologists it is said that the prefixes *ac* and *ag* in a great num-

ber of Eng. words derived directly from the Latin, *e.g.* accede, accelerate, accord, aggrandise, aggravate, were borrowed originally from the sign of the Gaelic present participle *ag* or *aig* (=ing), which preceded, instead of following, the root. Like Gaelic, Modern Eng. and Fr. are peculiar in the use of silent letters and consonants that merely serve to lengthen or broaden the sound of a preceding vowel. For example, as the Gaelic aspirate modifies the sound of *m* or *b* into that of *v* or *f*, and of *d* into *y* at the beginning of a word, and silences *d* altogether at the end if followed by an aspirate, similarly *g* is silent in our gnome, gnat, gnarl, and *k* in kneel, knot. The Fr. peculiarity of sounding the singular and plural of the third persons of their verbs alike is also apparently a result of their Celtic ancestry.

A curious survival of Gaelic choruses and Druidical chants in Gaelic is to be seen in the apparently meaningless words 'fal, la!, la!'; 'tooral, looral'; 'hey nonnie, nonnie,' and 'down, down, derry down.' For example, the chorus in Morley's *Invitation to May*, 1595—

'Now is the month of Maying
When merry lads are playing,
Fal, la, la!
Each with his bonnie lass
Upon the greeny grass,
Fal, la, la!'

The Gaelic interpretation of these syllables is 'Welcome! the day!' (*Fal* abbreviation *faill*, welcome, and *la*, a day).

Again, Shakespeare in many passages uses 'hey nonnie, nonnie,' which in Gaelic signifies 'Hail to the noon.' For example, in *Much Ado about Nothing*, Belthazar sings the well-known lines—

'Sigh no more, ladies, sigh no more
Men were deceivers ever,'

and ends with

'Converting all your sounds of woe
Into hey nonny, nonny.'

Literature.—The most ancient literary specimen relating to the Scottish Gaels is the *Book of the Deer*, or *Book of Deir*, which contains part of the gospel in St. Jerome's Latin version in handwriting reputed to be of the ninth century. Philologically and historically this MS. is of considerable importance from the notes inserted in the opening leaves in Gaelic, evidently about the twelfth century, and throwing light on the life of a period which is essentially a sealed book to the modern scholar. After the twelfth century there followed a long period of literary sterility

in the Scottish Gaelic language, the written language having almost entirely disappeared. Such MSS. as are preserved are in the Irish language. Even after that period down to comparatively recent times the greater brilliance of the Irish literary Gaelic continued to overshadow that of the Scottish. There is, however, in the Advocates' Library at Edinburgh the celebrated codex of verses (said to be the oldest extant Scottish Gaelic verse), known as the *Dean of Lismore's Book*, compiled by Sir James Macgregor, the dean of Lismore. As a Scottish work it fails to the extent to which it is devoted to the work of Irish bards, the book containing a number of Ossianic ballads, nine of which are ascribed to Ossian himself (as to Ossian or Ossin, see below). A number of books mainly of a devotional character were translated into Gaelic from time to time, for the use of Scottish Highlanders; but down to the eighteenth century the blank in Scottish Gaelic literature is relieved only by a few MSS. like the *Red Book of Clanranald*, dealing with the history of the Scottish clans of Macdonald and Montrose, and the *Book of Fernaig*, a compilation of religious and political poems; and the collection of poems entitled Mackenzie's *Beauties of Gaelic Poetry*, 1904, chiefly remarkable for the ballads of the famous woman-bard, Mary MacLeod, couched in the metre and language of the 'Keen' (see below on *Poem Book of the Gael*). The reputed first book actually printed in Scottish Gaelic, apart from the devotional books above noticed, was the Gaelic vocabulary compiled by the Scottish poet Alexander Macdonald (commonly called Mac-Mhaighstir-Alastair). His verse composed during the exciting days of the rebellion of '45 constitutes the first original literary work printed in Scottish Gaelic. His poetry has had a tremendous vogue, partly owing to its essentially melodious character; but also to its inspiring qualities, a number of the poems being stirring exhortations to the supporters of the Stuart cause in an intensely patriotic vein. But incomparably the most popular work of the Scottish Gaelic poets was that of Dugald Buchanan, the schoolmaster of Perthshire. His sacred poems and hymns earned him the sobriquet of 'the Cowper of the Highlands,' and Highlanders to this day eulogise the style and metrical excellence of his verse. The most notable of his hymns, which are collected in the *Lavadh bh Spioradail* (Spiritual Hymns), first published in 1767, are, 'Latha a' Bheithcanis' (The Day of Judgment), 'Am Bruadar' (The Dream), 'An Claicann' (The

Skull), and 'An Geamhradh' (The Winter). The majority of them reflect the Calvinist belief in the literal horrors of damnation and give ample expression to the terrifying purgatorial scenes conjured up in the poet's imagination.

Of far greater interest from a purely literary standpoint is James Macpherson's *Poems of Ossian*, the publication of which led to a bitter controversy as to their authenticity, which culminated in an inquiry by the Highland Society and a considerable literature. The result of the controversy (see L. C. Stern, 'Die Ossianischen Heldenlieder,' translated in *Transactions of the Gaelic Society of Inverness*, vol. xxv.), establishes that though the characters introduced by Macpherson were not fictitious in the sense that they were known to the traditions of the highlands, and that there were in existence ballads repeated orally among the Highlanders relating to the deeds of mythical heroes, yet Macpherson had pieced together into an apparent sequence the fragmentary nature of this raw material with compositions of his own containing sentiments familiar in classic epics like the *Iliad*.

Of later Highland poets Ewen Mac-lachlan's Gaelic poems of nature and romance contain many exquisite lines, breathing all the amatory tenderness of the traditional Gaelic bard. The most noteworthy of them were published under the title of the *Metrical Effusions*. He also translated part of the *Iliad* into Gaelic, but died before he was able to complete his work. Peter Grant's sacred poems are as well known to every Highlander as those of Buchanan. Notable, too, in a lesser degree was the poetry of 'Rob Doon' (Robert Mackay). Among prose writers Norman Macleod's name is most noteworthy in Gaelic literature. But apart from his name and that of other modern writers, in the decaying Gaelic language there is but little prose, outside collections of folklore and proverbs, except religious books like Knox's *Liturgy*, Calvin's *Catechism*, and Kirke's version of the Celtic Bible, together with various dictionaries like Armstrong's *Gaelic Dictionary* (London), 1825, and the *Dictionaryum Scoto-Celticum*, published by the Highland Society of Scotland in two volumes (London and Edinburgh), 1828.

The Irish Gaelic language is infinitely richer in extant work than the Scottish, and indeed, as has been shown, inspired and set the style to most of what remains of the latter. Far from being confined to a little poetry, collections of folk-lore, and prose, conspicuous either by its

absence or confined to translations of religious works, Irish Gaelic can show miscellaneous tracts like the *Book of Leinster*, a bibliotheca or collection of historical MSS., poems, tales, and genealogies (written by Finn, Bishop of Kildare for Aedh MacCremhthainn, tutor of Diarmait MacMurchadha, the celebrated king of Leinster); chronicles of wars like the fragments in the *Chronicles of Picts and Scots*, and the chronicles of wars of the Irish with the foreigners like the *Cogadh Gaoidhel ne Gallaibh* (authorship attributed to MacLiag, the bard of King Brian): various compilations from ancient MSS. like the *Book of Ballymote*, the *Leabhar Breac*, or Speckled Book, the *Leabhar na-h-Midhri* (Book of the Dun Cow) and the *Book of Fermoy*, all in the Gaelic vernacular, containing a valuable miscellany of poems, tales, and legal matter: the celebrated 'Brehon Law Tracts'; ecclesiastical documents and lives of saints; works on medicine; and an inspiring array of ancient Irish annals, notably those of Ulster and Connacht, besides translations from foreign languages. It is impossible within the limits of a small volume to deal with the whole field of literature in the dialect of Irish proper, which, as we have seen, is practically the same as Scottish Gaelic, though many philologists distinguish by confining the term Gaelic to the Scottish dialect—a comparatively modern language—and include Irish proper under the general term Celtic. For fuller information on the literature of the Irish, Welsh, Manx, Cornish, Breton, and other dialects, rooted in Gaelic, reference should be made to works on Celtic literature, especially as to Ireland, O'Reilly's chronological account of some 400 Irish writers down to 1750: *The Transactions of the Ossianic Society*, containing the tales of the Ossianic cycle; *The Miscellany of the Celtic Society*, 1849; *Chronicon Scotorum*, dealing with Irish affairs down to A.D. 1135; and *The Annals of Loch Cé*; as to Welsh, the *Myvyrian Archæology*; the *Four Ancient Books of Wales*, containing the Cymric ballads of the sixth century; the *Mabinogion*, a collection of romantic tales and myths (an excellent translation of which, by Lady Charlotte Guest, is published in the Everyman Library), the most notable character in which is, perhaps, the bard Taliesin ('Radiant Brow').

A more detailed reference may, however, be made here to ancient Irish poetry, not only on account of its singular charm, but because it is really the groundwork of no small part of the earlier Scottish Gaelic verse. A choice anthology of Gaelic

religious and love lyrics has been published by Eleanor Hull, under the title of *The Poem Book of the Gael*, 1912. The whole of the poems are translated into English verse, in many cases the renderings being those of Miss Hull herself, who is well known as the author of the *Cuchullin Saga in Irish Literature*. The most striking of these poems are, of course, the Ossianic, several of which appear to have been taken from a MS. of lays collected in 1626 in and about the glens of Antrim, and sent out to an Irish officer to while away the tedium of a campaign in the Low Countries. Ossian, or Oisín, was the last of the ancient pagan heroes, and in the many collections of poems traditionally ascribed to him, or to his father and chief, Fionn MacCumhall, it is not always certain which of them are really authentic Gaelic poetry. Like legends, folklore, and many a romantic tale, the Ossianic poems have, to a large extent, survived by oral tradition, and do not exist in written form earlier than some 300 years ago. Miss Hull naturally regards the name Ossian as no more than a covering name for tales and poetry loosely strung together, the whole dominated by a common theme in praise of war and the chase. The worship of Nature, which runs through most of them, and the rugged note of the fighting clansman are in curious contrast to the simple piety of religious poems like those of Conor O'Riordan, and some quaint 'charms' against evils rendered by Lady Wilde. One of these religious poems, according to Miss Hull, was taken down from a certain Mary Clancy of Moycullen, 'who keened it with great horror in her voice, in a low sobbing recitative.' The words, themselves of no great poetic value, are eloquent of the extraordinarily deep religious instincts of the Irish race. But the principal religious poem of ancient Ireland is the celebrated *Salúair na Ráinn*, or *Psalter of the Verses*, attributed to *Oengus the Culdee* of the ninth century. It contains 150 poems and is not inaptly regarded as the *Irish Paradise Lost* and *Paradise Regained*, dealing as it does with the Creation of the Universe, the Heavenly Kingdom, the Forbidden Fruit, the Fall, and Expulsion from Paradise, the Penance of Adam and Eve, and the Death of Adam. The only complete existing copy of this poem is contained in the Bodleian MS., the text of which was published in 1833 by Dr. Whitley Stokes. Miss Hull's is the first English translation, and her work repays study if for no other reason than the curious Irish conception of the universe with its faint

flavour of Lucretius, softened albeit by the mystic notion of eight winds fashioned in manifold hues. The purely pagan Gaelic poems are strongly tinged with mysticism, and display in a marked degree the sort of conflict of an open and joyous temperament, weighing its material love for the songs of birds, the dancing songtime, and all the glories of brilliant Nature against the advancing claims of Christianity to a whole-hearted enthusiasm for the purely spiritual. Some of these poems are of unquestionably fine dramatic power, and reveal a subtle beauty of correspondence between the sentiments of the 'Keen' ('Keeners' are professional Irish singing mourners), and the imaginary scenic surroundings of the singer. Especially noteworthy in this respect is the 'Old Woman of Beare' lamenting the halcyon days of her past pleasures and bemoaning the 'gravity of her nun's veil'—an allegory like that of many other similar Gaelic poems illustrating Ireland represented as an old woman in the grip of the all-dominating Christian ethic and its comparatively ascetic rule of life. Of a certain haunting beauty, if disjointed in sentiment, are the love lyrics, like *Is Claidhte an galar an grádh* (Love is a Mortal Disease) and *Ceann Dubh Dhíleas* (Beloved Dark Head). In many of them is the characteristically Gaelic dramatic quality of the harmony of amorous yearning with darkling trees, mountain glens, or other backgrounds of external nature. Several are laments on untimely deaths, echoing a fatalistic acceptance of the fierce vindictiveness and jealousy of the Gaelic character. The 'Keen on Art O'Leary,' which originally appeared in Mrs. Morgan J. O'Connell's *The Last Colonel of the Irish Brigade*, is a dirge of singularly moving pathos, composed by 'Dark Eileen' upon the death of her husband, Art O'Leary, who was shot at Carriganine under circumstances that reflect no undue credit on anti-Catholic prejudice. It appears from Eleanor Hull's notes that the popularity of O'Leary excited the jealousy of a neighbour named Morris, who, after seeing his horse beaten in a race by that of O'Leary, demanded, under the Catholic Penal Laws which prohibited a Roman Catholic from owning a horse valued at more than £5, that O'Leary should sell his horse to him for that sum. O'Leary refused, and the other secured his outlawry, as a result of which O'Leary was shot by soldiers in ambush.

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and Literature of the Scottish Highlands, 1876; Armstrong, *Gaelic Dictionary and Grammar*, 1825; *Poem Book of the Gael* (Eleanor Hull), 1912; M'Kenzie, *Beauties of Gaelic Poetry*; *Chronicon Scotorum* (a chronicle of Irish affairs to A.D. 1135), 1866; *The Annals of Loch Cé*; *The War of the Gaedhil with the Gaill* (ed. by Dr. Todd), 1867; Highland Society's *Gaelic Dictionary*; Mackay, *Gaelic Etymology of the Languages of West Europe* (a book to be used with caution); *Transactions of Ossianic Society*; MacLagan, *Scottish Myths*; Nicolson, *Collections of Gaelic Proverbs*; James Logan, *The Scottish Gael*; *Celtic Manners*; Campbell's *Popular Tales of the West Highlands* (Edinburgh) 1860–62.

Gaertnera, a genus of Rubiaceæ. It is common to the tropical districts of Africa and Asia; some of the species are cultivated for their fragrant blossoms. Of these *G. racemosa* is one of the best known.

Gaeta, a tn. and fortress of Campagna, Italy, situated some 70 m. N.W. of Naples on the Gulf of G. It is the seat of an archbishop and was the scene of the last stand of the reigning prince of Naples against United Italy (1861). In Roman times it was known as Portus Caeta. It is one of the best ports in Italy. Pop. (commune) 18,096.

Gætulia, the name given in classical times to the region immediately S. of Numidia and Mauritania in Northern Africa. The country was inhabited by a Libyan race who are probably the ancestors of the modern Berbers. They were conquered and made part of the empire by the Romans at the beginning of the Christian era.

Gage, see Gauge.

Gage, Lyman Judson (1836–1927), American financier, b. June 28, at De Ruyter, Madison co., N.Y.; educated at Rome, N.Y. Rose from bank clerk to president of Board of Columbian Exposition, Chicago, 1892. In 1897, made secretary to Treasury, remained so till Jan. 1902. Died Jan. 26.

Gage, Thomas (1721–87), an English general. He served in America and Flanders, and was later appointed governor of Montreal. He commanded the British forces in the American War of Independence.

Gager, Charles Stuart, American botanist, b. Dec. 23, 1872, at Norwich, N.Y.; son of Chas. Carroll G. Graduated, Syracuse University, 1895; studied, N.Y. State Normal School, Harvard Summer School, and Cornell University. Filled various positions in his native state, professor of botany, University of Missouri, 1908–

10; after that, director of Brooklyn Botanical Garden. Wrote: *Errors in Science Teaching*, 1901; *Non-Technical Lectures*, 1913; *The Relation between Science and Theology*, 1925; various botanical works.

Gahanbars, the name applied to the six annual Parsee festivals. Each of the festivals lasts for five days.

Gahnite, an ore of zinc belonging to the class known as spinels. It varies in composition, and may contain several elements other than zinc. Part of the zinc may be replaced by iron or magnesium. The general formula may be given as $(ZnFeMg)(AlFe)_2O_4$.

Gaiety Theatre, London, was opened in December 1868 by John Hollingshead. The first productions were: *On the Cards*, by F. C. Burnand, and *Robert the Devil*, by Gilbert. The new building was opened in 1903 with Mr. George Edwardes' *Orchid*. Among other early plays which appeared at this theatre were *The Spring Chicken*, *The New Aladdin*, *The Girls of Gottenburg*, and *Our Miss Gibbs*. In more recent years the G. T. has had *The Beauty Spot* (1917), *Going Up* (1918), *The Kiss Call* (1919), *Catherine* (1923), and *Love Lies* (1929). The Gaiety is in the Strand, on the north side, at the west end of Aldwych.

Gaillac, a French tn., dept. of Tarn, situated on the R. Tarn, near Albi. The town was built round a great Benedictine monastery of the tenth century, and still has a great wine trade. Pop. 4921.

Gainesville: (1) A city of Florida, U.S.A., and co. seat of Alachua co. It stands in the midst of a county which yields cotton and fruit in abundance. There are phosphate and fertiliser industries, bottling works, etc.: market gardening is also carried on. It is a well known winter resort. The East Florida Seminary is situated here. Pop. 10,465. (2) A city of Texas, U.S.A., situated in Cooke co. It is a great industrial centre and manufs. cotton-seed oil, flour, and iron ware. Pop. 8915. (3) A tn. of Georgia, in Hall co. Is a mining centre, and has some cotton mills, and is a popular summer health resort, with mineral springs. Its chief manufactures are cotton-seed oil. It is the seat of the Brenau College. Pop. about 8624.

Gainsborough, a market tn. situated on the R. Trent, Lincolnshire, England, about 15 m. N.W. of Lincoln. Its chief industries are shipbuilding, engineering, and the manufacture of agricultural implements, also oil, linseed cake, malt and cordage. A tumulus here is supposed

to be the tomb of King Sweyn. The tn. has a very fine bridge and a manor house, said to have been founded by John of Gaunt. Pop. 19,637.

Gainsborough, Thomas (1727-1788), a portrait and landscape painter, b. at Sudbury in Suffolk, where he received small schooling, but where, by the age of ten, he had 'sketched every fine tree and picturesque cottage.' At fourteen he went to London, studied etching under Gravelot and painting under Hayman. At nineteen he married a young lady with £200 a year, and started housekeeping in Ipswich,



THOMAS GAINSBOROUGH

where he remained till he moved to Bath in 1759. His studio soon became a resort of wealth and fashion, and among his sitters at this period were Richardson and Sterne, the novelists, and Garrick, whom G. regarded as 'the greatest creature living.' Moreover, he patronised musicians of every nationality, himself tried to play the harp, hautboy, and viol-da-gamba, and was a welcome *habitué* at the green-room of Palmer's Theatre. In 1768 G. was chosen one of the thirty-six foundation members of the Royal Academy, and was a regular contributor at its exhibitions until 1784, when he virtually retired because, in his opinion, 'The King's Daughters' had been unfavourably hung. In 1774, at the height of his fame, he removed to London, where he paid £300 for his share of Schomberg House, Pall Mall. Here he painted a number of the great people of the day, among them Dr. Johnson, Clive, Franklin, Sheridan, Canning, Burke, Lady Mary Montagu, and Mrs. Siddons, whose portrait is still one of the treasures of the National Gallery. His death was

due to a cancer which rapidly developed after a chill caught whilst attending the trial of Warren Hastings. At the last he was reconciled with Reynolds, his rival and former friend, who came to him on his death-bed and who was dismissed with the words: 'We are all going to heaven, and Van Dyck is of the company.'

It was Reynolds who generously and truly prophesied that, with the growth of an English school, 'the name of Gainsborough will be transmitted to posterity as one of the very first of that rising name.' His contemporaries were almost unanimous in their preference for his landscapes, a judgment due largely, no doubt, to the pre-eminence of Reynolds in portraiture, but one, nevertheless, which most critics of to-day will endorse. In his earlier works he faithfully reproduced nature down to her smallest detail, but when he grew older, his landscapes became, as Ruskin justly remarked, 'rather motives of feeling and colour than earnest studies.' Whilst Richard Wilson looked back to Claude for much of his inspiration, G. sought always, as in his 'Waggon and Horses Passing a Brook,' 'The Cottage Door,' and 'The Market Cart,' to give an individual and personal rendering of what he saw, anxious above all to present a harmonious picture of an artistic impression. His portraits, such as 'Orpin, the Parish Clerk,' and 'Master Buttall (the Boy Blue),' although invariably graceful and often expressive to a high degree of a passing phase or gesture, have all the merits of instinctive genius without any of the laborious finish essential to the best work. His lightning speed might secure a good likeness, but the style was inevitably one of 'hatching and scumbling.' Yet such is the exquisite blend of shining draperies with backgrounds of soft cloud-girt skies and feathery trees of spraying lightly touched foliage; such is the solemn grandeur produced by the glow and richness of his colours and the transparency of his shadows, that even his least scholarly portraits are justly deemed masterpieces. See *Lives of the Painters*, by A. Cunningham.

Gairdner, James (1828-1912), an English historian, b. at Edinburgh. He entered the Public Record Office when a boy, and afterwards became assistant keeper. He edited a considerable number of historical works, and contributed much to modern historical literature. His accuracy has seldom been at fault, and he proved himself a man of unprejudiced judgment. Amongst his works may be mentioned: *The Paston Letters*, 1872-75; *Henry VII.* (Eng. States-

men series); *Richard III.*, 1878; *Letters and Papers of the Reign of Henry VIII.*, 1863; *Richard III. and Henry VII.*, 1858; *Studies in English History*, 1881; *The Early Tudors*, 1902; *History of the English Church in the 16th Century*, 1902.

Gairloch, a Scottish vil., 30 m. N.E. of Portree in Skye. The village is the centre of large cod fisheries. It is mentioned in *My Schools and Schoolmasters* by Hugh Miller. Pop. 2776.

Gaisin, a tn. in Russia in the gov. of Podolia. Pop. 11,000.

Gaius, or **Caius**, a Rom. jurist and one of the five great luminaries of Rom. jurisprudence, the others being Papinian, Paul, Ulpian and Modestinus. Probably b. in the time of Hadrian, and flourished during the second Christian century, writing under the Antonines. Nothing is known of his personal history, although he himself tells us that he was an adherent of the school of Sabinus. He composed, besides other works he is known or believed to have written, a treatise on the *edictum provinciale*—i.e. the edict of the proconsul in the provinces—and a commentary on the Twelve Tables (*q.v.*) But the work by which he is known to all law students is his Institutes, and the discovery of the manuscript of this work by Niebuhr in 1816 has very greatly contributed to our modern knowledge of Rom. law. The manuscript had been written over with the letters of St. Jerome, and its very existence was all but unsuspected until Niebuhr found it while examining the contents of the library of the Chapter at Verona. The work formed the basis of the Institutes of Justinian (*q.v.*), who has followed the order in which G. treats his subject, and adopted his exposition of law, so far as it was applicable to the times in which Justinian's Institutes were composed. The work of G. affords a valuable comparative study, showing where the law changed between the two periods, and so enables us to understand what the law had really been at the time when its system was most perfect. The best edition of Gaius is that of Poste. Other edns. are those of Krüger and Studemund (4th edn., 1900) and Abdy and Walker (1885).

Galactose (formula $C_6H_{12}O_6$), one of the hexose sugars, isomeric with glucose (grape sugar) and fructose (laevulose or fruit sugar). G. exists in three forms, viz. inactive, dextro-, and lævo-rotatory. The dextro-modification is obtained, together with glucose, by the hydrolysis of milk-sugar. On reduction it yields the alcohol dulcitol, and on oxidation first galactonic acid and finally mucic

acid. Melting point 166°. Potassium hydroxide converts *d*-G. into a mixture of *d*-tagatose and ψ -tagatose.

Galacz, *see* GALATZ.

Galago, the name of a genus of Lemuridae found in Africa. The species are small, carnivorous animals with long, bushy tails. *G. crassican data*, of the W. coast, the largest species, is about the size of a cat; *G. senegalensis*, common in equatorial Africa, inhabits the mimosa forests.

Galahad, in the Arthurian romances the son of Lancelot and Elaine. In the cycle of legend he is the model of ideal knighthood and purity. He sets out on the quest of the Holy Grail, and on his journey redresses all grievances that cross his path.

Galanga, or Galangal (Chinese *Kao*, name of a prov., *liang*, mild, and *kiang*, ginger), the name given to *Alpinia*, a genus of plants belonging to the Zingiberaceae; it contains many species, the most important being *Alpinia officinarum*, a native of S. China. The roots and stems of this plant possess aromatic, stimulating properties similar to those of ginger, and are largely used in Eastern pharmacy.

Galapagos (Sp. tortoise) Islands, a group of volcanic islands in the Pacific near the equator, W. of Ecuador, to which they were annexed in 1832. The chief islands include Albemarle (largest), James, Charles, Chatham, and Indefatigable. The group was discovered by the Spaniards in the sixteenth century. They were once noted for tortoises of enormous size (*Testudo elephantopus*), which are now far less numerous. Large turtles abound, and there are remarkable peculiarities in the fauna and flora. Darwin explored the islands. The total area is about 2950 sq. m. Pop. about 400. *See* Darwin, *A Naturalist's Voyage on H.M.S. Beagle*, 1866; Wallace, *Geog. Distribution of Animals*, 1876; Wolf, *Ein Besuch den G. Inseln*, 1879; Agassiz, 'The Galapagos Islands,' in *Bull. Mus. Comp. Zool.*, vol. xxiii.

Galashiels, a parl. bor. and tn. in Selkirkshire, Scotland, situated about 4 m. N.W. of Melrose and Gala Water. The chief industry of the town is the manufacture of Scotch tweeds, and to this industry the prosperity of the town is due. The residence of Sir Walter Scott, Abbotsford, is just outside the town. Pop. 12,946.

Galata, a suburb of Constantinople situated at the southern end of the Bosphorus. Here are found principally the banking houses and shipping agencies. There is also a lighthouse here.

Galatea, a sea-nymph, daughter of Nereus and Doris, *see* ACTS.

Galatia, (1) an anct. dist. of Asia Minor. The name is derived from the Galatæ who invaded and settled in that part of the peninsula about the third century B.C. It was included in the Rom. empire and under Augustus became a Rom. province. The towns of Antioch, Derbe, and Lystra, all of which were visited by St. Paul, are in this district. (2) a village of Saline, co. Ill., near Eldorado. Pop. 700.

Galatians, St. Paul's Epistle to the, one of the four epistles undoubtedly written by St. Paul, and forms part of the N.T. Marcion's canon contains the first allusion to it, but by the second century it was widely read and appreciated. It was probably composed at Ephesus about A.D. 56, although some critics believe it was dispatched from Achaia or Macedonia during the winter or spring of A.D. 57-58, and an attempt has been made to antedate the Council of Jerusalem. The epistle was addressed, it seems, to the inhabitants of that part of Galatia which bordered on Bithynia and the province of Asia. They were mostly of pagan birth, in the main Celts, though there were Phrygian aborigines and Rom. and Gk. immigrants besides. During his missionary journeys, St. Paul had founded and revisited the churches of Galatia. The epistle, which 'reads like a dithyramb from beginning to end,' was a passionate outburst, containing, strangely enough, no word of praise, greetings, nor messages against the 'lapse,' who had been won over to circumcision and countless other formal observances by certain Judaizing enemies of St. Paul. Briefly speaking, the letter is divided into a vindication of his mission and apostolic independence, an inspired exposition of how Christianity had superseded the Mosaic law, a panegyric of faith as the mark of the true 'son of Abraham,' and finally a fervid plea for the superiority of Christianity to legalism as the 'free and final religion.' The whole style of the epistle, which has been described as 'a veritable torrent of genuine and inimitable Paulinism'—and especially the spontaneous but jerky thought development with its hurried sentences and abrupt pauses—argues that St. Paul's mind was agitated by a grave and personal crisis.

Galatz (Rumanian *Galăți*), a tn. in Rumania, important as a port and as the seat of a bishop. It is situated on the l. b. of the Danube. It is the seat of the Rumanian III. Army Corps and the naval school, the International Danubian Commission and the chief Danube shipping companies, and three chambers of com-

merce. It is an important industrial town and among its chief industries are the manufactures of candles, soap, wire, nails, buttons, chemical products, iron and copper. It possesses saw mills, paste-mills, flour-mills, roperies and petroleum refineries. It is the chief port of entry for the over-sea trade of the Danube and the chief port for the export of timber. Other exports are maize, wheat, barley, rye and flour. The rapid growth of the town is due to the opening up of the Danube carrying trade. It has been the scene of two engagements between Turks and Russians. Pop. 154,000.

Galaxy, or Milky Way (from Gk. γάλα, γάλακτος, milk), the name of a splendid luminous belt of innumerable stars, which may be seen, on a clear night, stretching in a great arc from horizon to horizon. It surrounds the whole earth in what is almost a great circle, and is inclined to the equinoctial at an angle of 63°. For some 150° the zone spreads out into two branches—one shining, the other dull and disconnected—which eventually re-unite. To the naked eye the stars are merged together in one broad stream of light. The word G. is figuratively applied to a distinguished gathering of people, as, for instance, in the phrase, 'a G. of wit.'

Galba, Servius Sulpicius (3 B.C. to A.D. 69), a Rom. emperor, became consul in A.D. 33, and under Nero showed courage, force and equity in the administration of Aquitania, Africa, and Hispania Tarraconensis. With the help of Vindex, Otho, and the Prætorian Guard, he became emperor instead of Nero in A.D. 68. But no sooner was he fully instated than he lost all his popularity and became a laughing-stock for his extreme avarice, the extortions of his favourites, to whom he surrendered the reins of power, and his refusal to pay the soldiers the promised rewards. In A.D. 69 Otho led a successful mutiny and became emperor in his place. G. was assassinated by Otho's legionaries.

Galbanum, a gum-resin obtained from *Ferula galbaniflua* and *F. rubricaulis*, two species of Umbelliferæ. It is used medicinally as an antispasmodic expectorant, and external rubefacient, but is inferior in power to asafoetida obtained from an allied species.

Galdós, Benito Perez (1842-1920), a Spanish novelist and, in his time, Spain's foremost man of letters. Born at Las Palmas, Canary Islands. He was educated at Madrid, and when twenty years of age he returned to Madrid and worked for seven years as a journalist, afterwards devoting

himself to writing novels until a few years before his death, when he became blind. G. was a most prolific writer, and his great collection of works comprises early novels, two series of Spanish national historical episodes, contemporary Spanish novels, new Spanish historical episodes, comprising three series of fifteen works, dramas, and miscellaneous works. He first made a name with his historical novel *La Tintana de Oro*, and many of his books have been translated into English, amongst these being *Trafalgar*, *Leon Roch*, and *Marianela*. Since the time of Cervantes, Galdós was the writer who most influenced the Spanish mind. For nearly a quarter of a century he was a member of the Royal Academy of the Spanish Tongue, but he more than once refused official honours owing to his excessive modesty. He sat in Parliament on several occasions as a Republican member. The honour in which he was held was shown at his funeral, there being an enormous attendance of members of all the academies, members of the government, the whole of the Madrid Town Council and provincial deputies; while the official *Gazette* announced a decree of the government offering to pay all the expenses of the funeral of 'Spain's greatest writer since Cervantes.' Many of his theatrical works have been played both in Spain and in other countries, the best known being *Gloria* and *Electra*.

Gale, see STORM.

Gale, Sweet, see BOG MYRTLE.

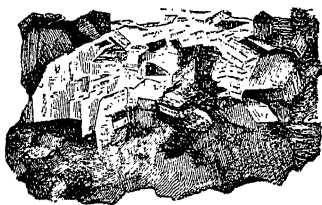
Gale, Zona, American authoress, b. Aug. 26, 1874, at Portage, Wis.; dau. of Chas. Franklin G. Graduated University of Wisconsin, 1895. On Milwaukee papers till 1901; on New York *World*, 1901-04. Member of board of regents, University of Wisconsin. Works include:—*Romance Island*, 1906; *Friendship Village*, 1908; *When I was a Little Girl*, 1913; *Birth*, 1918; *Peace in Friendship Village*, 1919; *The Secret Way* (verse), 1921; and plays—*The Neighbors* (1-act); *Uncle Jimmy* (1-act); *Miss Lulu Bett* (awarded Pulitzer prize), produced 1920; *Mister Pitt* (dramatisation of *Birth*), produced 1924.

Galen (or Galenus), Claudius (c. A.D. 130-201), a Gk. physician, b. at Pergamos in Mysia, Asia Minor. He studied medicine here, and later travelled to the towns of Corinth and Alexandria in order still further to continue his studies. He went to Rome where he spent some years in study, afterwards being made physician to the Emperor M. Aurelius. He also attended the emperors Commodus and Severus. He is supposed

to have died in Sicily. He gained a great reputation in all branches of medical science, and was a great writer on this subject. His discourses, and his commentaries on Hippocrates are very learned and show great medical knowledge; they prove beyond doubt that he was a practical as well as a theoretical scientist. For many years they formed the basis of the world's medical knowledge. Many of the works attributed to him are, if not spurious, at any rate so doubtful that we cannot recognise them as his. There are, however, about eighty treatises which are beyond doubt genuine.

Galena: (1) An American city situated in the state of Illinois, U.S.A., the cap. of Jo Daviess co. It is the centre of a lead mining industry and has foundries, machine-shops and flour-mills. Chief manufactures are shoes, furniture, lumber, etc.; chief exports, lead, zinc, dairy produce and grain. It was the home of President Grant and it has a German-English College and the St. Clement Academy. Pop. about 3878; (2) A city of Kansas, Cherokee co., an important centre of the lead and zinc industries, and there are large smelting and stamping works. It is the seat of Spring River Academy. Pop. 4736.

Galena, or **Lead-glance**, the naturally occurring sulphide of lead (PbS) which constitutes the chief source of the metal. G. is found widely distributed in the form of cubic crystals of



GALENA OR CALCAREOUS SPAR

a lead-grey colour (sp. gr. 7.5; hardness, 2.5), occurring chiefly in veins in the carboniferous deposits, and often accompanying other metallic ores. G. is easily oxidised, and the metal is readily obtained by reduction. Some specimens contain so much silver that the separation of that metal is profitably carried on. *See* LEAD.

Galeopithecus, the name given to the single genus of the Galeopithecidae, a family of Insectivora which is sometimes included among the bats or the lemurs. They inhabit the forests of Malayasia and the Philippine Islands,

flying from tree to tree by means of the patagium, or parachute-like membrane; when at rest they hang by their posterior limbs, head downwards, after the manner of bats. They are about the size of cats and are nocturnal animals. There are only two species, *G. volans* and *G. philippinensis*.

Galesburg (named after a famous Presbyterian preacher, George Gale), the county tn. of Knox co., in the N.W. of Illinois, U.S.A. It is on the Atchison, Topeka, and Santa Fé, and also the Chicago, Burlington, and Quincy Railways, the latter having important steam-car factories here. Machinery and vitrified bricks are also manufactured, the total value of factory goods having gone up 52 per cent. in the five years 1900-05. Other manufactures are brooms, wagons and corn-planters. Knox College, founded in 1837, and Lombard College, chartered in 1851, are important educational establishments, also the Ryder Divinity School and St. Joseph's Academy. Pop. about 28,830.

Galgacus, a Caledonian chieftain, who headed the desperate resistance offered about 85 B.C. to the Rom. invaders under Gn. Julius Agricola. He was finally defeated at the battle of the Grampians.

Galiani, **Ferdinando** (1728-87), an Italian political economist, published in 1750 his *Della Moneta*, a revolutionary description of coin or currency. For he maintained that money being a merchandise, must not be restricted, either as regards interest or value, a doctrine at once adopted into the practice of his native city Naples. In the later edition of 1780 he enlarged on the intrinsic value of the precious metals, and on their suitability as media of exchange.

Galicia (Polish *Halicz*), now Polish territory but before the Great War the largest prov. (30,307 sq. m.) and a crownland of Austria, being then bounded to the N. and E. by Russia, to the S. by Bukovina and Hungary, and westward by Austria and Prussian Silesia. An arc of the Carpathians, whose highest summits in this province are Wolowiec (6773 ft.) and Cserna Góra (6505 ft.), forms a southern boundary, and from its ridges both the Dniester and Pruth take their source within G. The Vistula, which becomes navigable below Cracow, hems in the province on the N.W. The climate is very severe; the winters are long and the summers short. The region is largely forested but there are extensive tracts of pasture land. The soil is fertile and wheat, rye, barley, oats and maize yield

good crops, also hemp, flax and tobacco. Potatoes are grown in large quantities. Horned cattle and horses are bred, also sheep, goats, swine, etc. Salt, petroleum, and coal are the most valuable minerals, the first being mined at Wieliczka, Bochnia, Kalusz, and Dolina, etc.; the second at Boryslaw. Slohoda-Run-gurska (near Kolomea), and Polanka, etc.; and the third in the district of Cracow. Other minerals are marble, alabaster, copper, calamine, and iron. Manufactures are backward, but textile goods are made in Biala, and distilling is important. The chief exports are salt, petroleum, cattle, hides, wool, coal, linen, anise-seed and brandy. Lemberg (Lwow) (pop. 159,618) is the capital, and Cracow (91,310), Przemyśl, Kolomea, Tarnopol and Stanisław, all have over 25,000 inhabitants. Educational establishments are numerous, the chief among them being the universities of Lemberg and Cracow. G. was a crown-land of Austria between the years 1772 and 1918, but by then was virtually independent. Both Poles and Ruthenians claimed her, and fighting occurred, until in 1919 the supreme council assigned West G. to Poland and East G. the right of self-determination. In Dec. of that year it was announced that East G. should be granted autonomy under a Polish protectorate for twenty-five years; the future then to be decided by the League of Nations. In March 1923 the Council of Ambassadors recognised East G. as a part of Poland. Pop. over 8,000,000; chiefly composed of Poles and Ruthenians.

Galicia, Campaign in (Great War). In the early months of the Great War the Russians attempted to break through to Germany via Bohemia, which necessitated an advance through Galicia. In Sept. 1914, they swept over Tarnopol, Lemberg and Przemyśl, but were arrested at the Carpathian Mountains, which were strongly held by an Austro-Hungarian force which offered the stoutest resistance. In the spring of 1915 the Gers., under von Mackensen, broke through the important Gorlice pass and soon hurled the Russians back. Mackensen relieved Przemyśl at the commencement of June and Lemberg towards the end of the month. Brusilov (*q.v.*) commanded the Russians on this front, and as soon as he re-organised his force dealt the Austrians a severe blow S.E. of Lemberg in Sept. 1915. He made another attack in the autumn of 1916, but the Russian Revolution brought all operations to a standstill. (See also WAR, THE GREAT.—*Eastern Front.*)

Galicia, now a captaincy-general, and formerly a kingdom founded in the fifth century by the Suevi, occupies the north-western corner of Spain. It is covered by ridges of the Cantabrian Pyrenees, the highest peak (6593 ft.) occurring in the Peña Trevinca. The Miño, rising near Mondoñedo, with its great affluent, the Sil, which rises between Leon and Asturias, is the chief river (170 m. long). The deep fjords along the indented coast afford splendid anchorage, the chief harbours being Ribadeo, Ferrol, Corunna, Corcubion, and Carril. Both the mineral and agricultural resources are, as yet, poorly developed, but cattle and swine (which feed on the abundant chestnuts) are reared for export. G. (11,254 sq. m.), which is the dampest part of Spain, has also the densest population (about 2,000,000).

Galicz, see HALICZ.

Galignani, John Antony (1796–1873) and William (1798–1882), were two publishers in Paris. They continued to bring out the daily newspaper (written in English) entitled *Galignani's Messenger*, which their father had founded in 1814. In its columns they did what they could to establish cordial relations between England and France. Their connection with the paper was severed in 1884. A monument to their honour stands in Corbeil, where they built and endowed a hospital.

Galilee (from Heb. *Galil*, a border or ring), is rarely mentioned in the O.T., but some time after the return of the Jews from exile was surrendered by the Assyrians to the Israelites, and rapidly developed a vigorous nationalism, so that, when Palestine came under the Romans, G. became a tetrarchate under the Herods. In the time of Jesus Christ, the province spread from the Mediterranean to the Jordan, thus embracing all northern Palestine. Upper G. was mountainous and well wooded, whilst Lower G. was wonderfully fertile and flat. The province now forms part of Palestine, and still produces all kinds of pulse and gourd, corn, oil, and wine. In the time of Christ the chief cities were Scythopolis and Tiberias, though other places, such as Capernaum, Nazareth, and Nain, are much more important in the Gospel story. The inhabitants were chiefly Syrians, Phœnicians, Arabs, Greeks, and some Jews, whereas the population to-day consists of Moslems, Jews, Greek Christians, Arabs, Druses and Maronites. The Sea of G. called also the Lake of Gennesaret, the Sea of Tiberias, and the Sea of Cinneroth, is an expansion of the Jordan, 680 ft. above sea-level, 13 m. long, and 8 m.

broad. When Christ preached it was surrounded by smiling and happy villages, of which Renan draws a beautiful picture, as indeed of the whole country, in his *Life of Jesus*; but whereas this part of G. was once densely populated, it is to-day almost a wilderness, and even fertility seems to have deserted its shores. The people of G., despite the fact that in Judæa they were regarded as boorish provincials, whose Judaism was overlaid with despicable laxity and corruption, were attractive for their very simplicity, and happy, gentle dispositions.

Galilee, the architectural term for a porch or chapel attached to a church, examples of which may still be seen at the W. end of the naves in Ely and Durham cathedrals, and on the W. side of the southern transept

its duration. He tested his discovery by counting the beats of his pulse and comparing the number of pulsations with the time of the pendulum vibration, and at once saw the possibility of utilising his invention for chronometers. In his youth he also wrote a treatise on the specific gravity of solid bodies and constructed a hydrostatic balance. His next vital discovery was the equality of the velocities of all falling bodies great and small. Up to his time people had imagined that a body six times as heavy as another would fall through the same space in one-sixth the time, and although Galileo gave a practical demonstration of his principle from the Leaning Tower of Pisa, many among his audience continued unbelievers. In 1592 Galileo accepted the chair of



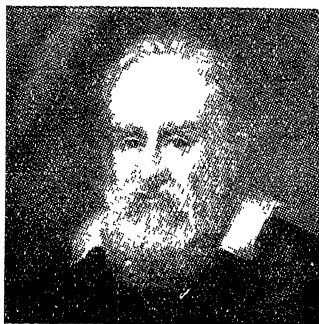
TIBERIAS ON THE SEA OF GALILEE

in the cathedral of Lincoln. They were used sometimes as the part reserved for penitents, sometimes for corpses previous to interment, and at other times as the meeting ground for monks and their women relatives, who might not penetrate farther into an abbey church.

Galilei, Galileo (1564-1642), an Italian experimental philosopher and astronomer, a native of Pisa, and, in 1581, entered the university there. At first he studied medicine, but early renounced this science in favour of experimental philosophy, finding a good friend in Guido Ubaldi, through whose good offices Galileo eventually obtained, in 1589, a mathematical lectureship in Pisa under the Grand Duke Ferdinand I. de' Medici. Having watched the swing of a bronze lamp in the Pisan Cathedral, Galileo soon discovered the isochronism of pendulum oscillations; for he found that the range of the swing or oscillation had no effect on

mathematics in Padua, as his revolutionary discoveries and still more his biting satire had made him many active enemies in Pisa. Here he worked till 1610, and among his numerous inventions were an imperfect species of thermometer, a proportional compass, and the all-important refracting telescope. The Dutch claim that Jansen made the first instrument of this kind, but at least Galileo was a pioneer in employing it for astronomical investigations. With his new appliance he revealed a series of startling and brilliant scientific facts. Never before his time had anyone declared that the Milky Way was, as Milton, who had visited Galileo, stated, 'powdered with stars,' or that the moon, far from being a smooth and self-luminous sphere, was diversified with great mountains and valleys, and lightened only by reflections of the sun's rays from the earth, or that the planet Jupiter had four satellites, or

that Saturn had a triple aspect (due to her rings), or, finally, that the sun which the schoolmen had regarded as a symbol of perfection was, in reality, besmirched with spots. After 1610, he worked freely in Florence under his new patron, Ferdinand II., to whom he dedicated, in 1632, his famous *Dialogue on the Ptolemaic and Copernican Systems*. Not content with showing that the latter adequately explained celestial movements, G. threw himself into theological controversy by trying to explain the congruity or incongruity of certain biblical texts read in the light of his theory. His interpretations ran counter to the accepted opinion, and already in 1616, though not condemned by name, he had been com-



GALILEO GALILEI

polled by the Roman Inquisition not to assert 'what seemed to contradict Scripture.' His 1632 publication therefore was taken by the Roman authorities under his former patron Urban VIII as a direct challenge. He was summoned to Rome, where he was obliged solemnly to abjure his 'heresies,' above all, that of the diurnal and yearly motion of the earth and of the stability of the sun. He was further to recite the seven Penitential Psalms once a week and was technically 'imprisoned,' i.e. under observation, for the rest of his life. The remark said to have been made to a friend—*Eppur si muove!* ('It moves for all that') is apocryphal. Inscrutable, but forgiving by nature, Galileo loved the amenities of social life and was qualified by taste and knowledge to pass judgments in poetry, music, and painting. Torricelli, who was passionately attached to his master, is the most famous of his pupils.

Galitzin, or Gallitzin, a famous and powerful Russian family whose mem-

bers have distinguished themselves alike in war and diplomacy from the sixteenth century onwards. The following were among the best known:

Vasili Vasiljevitch Galitzin, surnamed 'the Great,' regent during the minority of Peter the Great.

Dimitri Alexejevitch Galitzin (1735-1803), a Russian ambassador in Holland and France, and the intimate friend of Voltaire and Diderot.

Dimitri Augustine Galitzin (1770-1841), son of the preceding, was b. at The Hague. He was for some time vicar-general of the diocese of Philadelphia. Severely simple in his own mode of life, he was prodigal of help and sympathy to those around him, by whom he was universally known as 'Father Smith.'

Nikolai Sergievitch Galitzin (1808-92), an historian and lieutenant-general in the Russian army. His chief work is a history of war (Ger. trans. *Kriegsgeschichte seit den ältesten Zeiten* (13 vols.) 1874-89).

Galium, a genus of Rubiaceæ, consists of over 200 species, ten of which occur in Britain. They are herbaceous plants with whorls of leaves, and are visited by insects for the sake of the honey they secrete. *G. cruciatum*, the cross-wort, is a native of Europe, and is commonly found in Great Britain; *G. verum*, the ladies'-bedstraw or cheese-rennet, is found in dry soils and serves several useful purposes; *G. aparine*, the common goose-grass or cleavers, is a native of Europe, N. Asia, and N. America. The term bedstraw applied to many of the species is obtained probably from the old custom of strewing beds with fragrant herbs.

Gall, see BILE and GALL BLADDER.

Gall, Dr. Franz Joseph (c. 1757-1828), the founder of the system of phrenology, was b. near Pforzheim in Baden. He became physician in Vienna in 1785. Having studied exhaustively from boyhood the external manifestations on the cranium of the different powers of human mind and character, he began a series of phrenological lectures in Vienna, 1796. Chief works (in collaboration with Spurzheim) were: *Introduction au Cours de Physiologie du Cerveau; Recherches sur le Système Nerveux*, 1809; and the first two volumes of *Anatomie et Physiologie du Système Nerveux* (4 vols.), 1810-19. Consult Life by Jessie Fowler, 1896, and Dr. Bernard Hollander's *In Search of the Soul*.

Gall, St., tn. and com., Switzerland, see ST. GALL.

Gall, St., 'the apostle of the Alemani,' an Irish saint and pupil of St. Columba, whom he accompanied to Gaul about 585. After much mission-

ary work he retired to the forest of Steinach, near Lake Constance, and founded the famous monastery of St. G. The Swiss canton and town are also named after him.

Gallait, Louis (1812-87), a Belgian painter, was b. at Tournai, where he studied art and painted his picture of 'Christ Healing the Blind Man' now in Tournai Cathedral. He afterwards went to Paris to study art, where he also painted a number of pictures. Among his works are: 'The Abdication of Charles V.'; 'Alva looking at the bodies of Egmont and Horn'; 'The Last Moments of Egmont'; and 'The Plague of Tournai.'

Galland, Antoine (1646-1715), a French archaeologist and orientalist, b. at Rollet. In 1670 he went to Constantinople in the service of the French ambassador, and after two more voyages to the East he had gathered together some valuable antiquities. In 1701 he became a member of the Académie des Inscriptions, and in 1709 professor of Arabic in the Collège de France. His chief work is his translation of the *Arabian Nights*, being the first translation into a European language. He wrote also *Les paroles remarquables, les Bons Mots et les Maximes des Orientaux*, 1694.

Gallarate, a tn. situated in the prov. of Milan, Lombardy, Italy. It lies to the N.W. of Milan, and is engaged in cotton manuf. Pop. (commune) 22,000.

Gallas, Matthias von, Count of Campo, Duke of Lucera (1584-1647), an Austrian general, distinguished in the Thirty Years' War. He first served with the Spaniards in Savoy (1617), then with the army of the Catholic League, and was major-general of the forces which captured Mantua (1629). He commanded under Wallenstein in Bohemia, fighting against the Swedes at Nuremberg and Lützen (1632). G. then intrigued against Wallenstein, and after the latter's assassination succeeded to his command (1634), winning a notable victory at Nördlingen. Archduke Leopold superseded him (1638). G. was in command again in 1642, but was defeated by Torstenson at Magdeburg (c. 1644). His army earned a reputation for cruelty, and the word 'marauder' is derived from his 'Marode Brüder.' See Schiller, *Hist. of the Thirty Years' War*; Ersch und Gruber, *Allgemeine Encyclopadie*.

Gallatin: (1) Cap. of Daviess co., Missouri. It stands on the Grand R., and also on the Chicago, Rock Island, and Pacific, and the Wabash railways. Pop. 1504. (2) Cap. of Sumner co., Tennessee, is situated on the

Chesapeake and Nashville, and on the Louisville and Nashville railways. The Howard Female College is in this town, which has flour mills and manufactures spokes. Pop. 3050. (3) A river, rises in Montana, and is one of the forks of the R. Missouri. It flows in a northerly direction.

Gallatin, Albert (1761-1849), a famous American financier and statesman, b. at Geneva. He emigrated to the United States (1780) and, unsuccessful in trade, supported himself for some time by teaching French at Harvard College. He was elected to the United States Senate (1793), and made a member of Congress (1795). It was as Secretary of the Treasury (1801-13), that he first proved himself a great financier. He was mainly responsible for the favourable conclusion of peace negotiations with England in 1814, and himself signed the treaty of Ghent. After filling important diplomatic positions in Paris and London he returned to New York and retired from public life (1827). His works include: *A Sketch of the Finances of the United States*, 1796; *Indian Tribes, East of the Rocky Mountains*, etc., 1836; and *Semi-civilised Nations of Mexico, Yucatan, and Central America*, 1845. Consult Lives by Henry Adams, 1879, and J. A. Stevens (American Statesman series), 1883.

Gallaudet, Thomas Hopkins (1787-1851), an American and a teacher of the deaf and dumb. He was born at Philadelphia and took his degree at Yale. He afterwards became a student of theology at Andover, and after having obtained, in 1814, a licence to preach, visited Europe with a view to teaching the deaf and dumb. He studied in Paris under the Abbé Sicard, and in 1816 on his return to America founded a school for deaf mutes at Hartford, being the head of it until 1830. He wrote several works, among them *The Child's Book on the Soul*, 1832, and *The Youth's Book on Natural Theology*, 1832.

Gall Bladder. This organ is a pear-shaped membranous sac, 3 or 4 in. long and about 1½ in. across its widest part, and capable of containing 8 to 12 fluid drachms. It is lodged obliquely in a cleft of the concave lower surface of the right lobe of the liver. Its large end or *fundus* projects beyond the anterior border of the liver and is directed forwards, downwards, and to the right. Its upper surface is attached to the liver by areolar tissue, its under surface and *fundus* are covered by the peritoneum, which is reflected over them from the surface of the liver. The neck gradually narrowing is curved S-shape, and then

becomes much constricted and changing its general direction, it bends downwards and terminates in the cystic duct. This duct joins, at an acute angle, the single duct made by the joining of the right and left hepatic ducts, and the common channel to all three is termed the *common bile duct* which runs down to the second part of the duodenum. The chief function of the G.B. is to act as a reservoir for the secreted bile. The secretion of bile from the liver is continuous, unlike the other digestive secretions, which take place only during digestion and cease, more or less, during abstinence. But while the secretion of bile is continuous, its excretion or output into the duodenum is periodic, and coincides exactly with the period of digestion in which the acid chyme is spurted by rhythmical jets from the stomach to the intestine. It is, therefore, evident that the bile secreted during abstinence must all collect in the G. B., which, in short, is a lateral diverticulum of the excretory bile ducts, where the bile becomes condensed by absorption of water. The removal of the G. B. from dogs has been accomplished and the animals have recovered quickly without exhibiting abnormal phenomena of any significance. The ultimate result of such removal was a dilation of the various bile ducts to twice or even three times their normal calibre.

The cystic duct, in fact, appeared to be transformed into a reservoir for the bile, and had the appearance of a newly formed G. B. Experiments made by Oddi in 1887 resulted in the discovery of a special sphincter of plain muscle situated at the duodenal end of the common bile duct. The mechanism by which the flow of bile into the intestine is brought about consists in a reflex diminution in tone of this sphincter caused by the distension of the intestine and the entrance of the chyme from the stomach. It is, therefore, an inhibitory reflex discharged from a higher centre. The secretion normally poured into the G. B. consists in part of bile reabsorbed from the intestine, that which is collected from the G. B. is a mixture of the secretion from the hepatic cells and that of the epithelia which line the bile ducts and the G. B., and through condensation of the liquid contains up to 16 or 17 per cent. of solids.

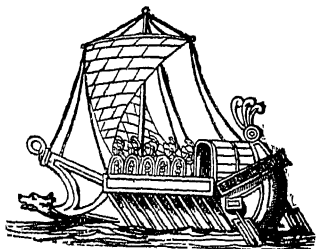
Galle, called also **Point de Galle**, a seaport tn. of Ceylon, situated in the S.W. of the island in the southern province. It has a good harbour, but is not so important now as a port of call for steamers to the East and Australia, since Colombo is now the port.

Tea-planting is a growing industry and the digging of plumbago, also grass growing for the distillation of citronella oil. The chief exports are plumbago, coco-nut oil, tea, rope and coir yarn. Pop. 39,073 (1921).

Galleon (Sp. *galeon*), a large ship used by Spanish merchants in the fifteenth-eighteenth centuries to convey gold and silver from Mexico and Peru to Spain. The ships, which were armed, possessed three or four decks.

Gallery means a long and narrow passage, raised above the ordinary floor of a room. These Gs. are often to be seen in churches, as in the case of the rood-loft, which is a G. forming a means of support and elevation for the rood or cross. Old mansions were almost always provided with a G. For G. in military mining, see **MINES: Military**.

Galley, a narrow and long boat having sails but usually moved by means of oars. Some of these boats were about 160 ft. long and 32 ft. wide, and had as a rule just over fifty oars, each of the latter having six or



GALLEY

more men to work it. These men, who wore chains, were usually either prisoners, Turks, or convicts, and had to work for long periods on these vessels, which were used largely by the Italians.

Galley Slaves (Fr. *galériens*; It. *galeotti*), the term applied in older times to convicted criminals who had to work out their hard labour as rowers on board a galley. In later days such convicts were principally employed on the docks and military harbours of France, Spain, and Italy.

Gall-flies are small hymenopterous insects belonging to the family Cynipidae and related to the ants and bees; they are black and wasp-like in shape, with straight antennae. The presence of the larvæ results in plant excrescences, or galls (*q.v.*) from which the insect emerges on reaching maturity. *A. rosæ* causes the beech-

guar gall which is commonly found on wild rose-trees and also on the cultivated plant. The true gall-makers are called Psenides, and in addition to the typical genus *Cynips*, include *Aphilotrix*, *Andricus*, *Neuroterous*. *C. gallatinctoria* produces the gall-nuts of commerce, and *C. insana* produces those known as Dead Sea Apples, or Apples of Sodom.

Gallia, in ancient geography 'the country of the Gauls' (Galli), in two great divisions, Cisalpine or Citerior (on 'this,' i.e. the Rom. or S. side of the Alps) and Transalpine or Ulterior (across the Alps from Rome). G. Cisalpine extended S. and E. from the Alps, and was bounded in Cæsar's time by Liguria, Umbria, and the Rubicon, comprising N. Italy between the Alps and the Apennines. Gallic invaders came here perhaps as early as the sixth century B.C. A Rom. colony was established at Sena Gallica (282), the country was reduced after the second Punic War (203), and its conquest finally completed on the defeat of the Boii (191). G. Transalpine extended N. and N.W. of the Alps, comprising all modern France (often loosely called 'Gallia'), Belgium, and parts of Holland, Germany, and Switzerland. The Rom. province of G. Narbonensis, originally called the Provincia (later Provence) was formed in the S.E. (121 B.C.). Julius Cæsar thoroughly subdued the whole territory (58-50 B.C.), then divided into three parts, Aquitania (S.W., inhabited by Iberians represented by the modern Basques), Celtic Gaul (in the centre, the cradle of the modern French nation), and Belgic Gaul (N.E. inhabited by Belgæ, closely allied to the Celtæ of central Gaul). Augustus made four provinces (27 B.C.), Narbonensis, Aquitania, Lugdunensis, Belgica. In the second century A.D. Christianity was introduced, and in the fourth century there were two dioceses, Galliarum, and Viennensis. After invasions by Vandals, Goths, and Franks in the fifth century, a fresh empire rose on the ruins of the old. See Thierry, *Hist. des Gaules*, 1872; Desjardins, *Géog. de la Gaule romaine*, 1877; d'Anville, *Notice de la Gaule ancienne*; Ukert, *Gallien*; Smith, *Dict. of Greek and Roman Geog.*; Freeman, *Hist. Geog.*

Gallic Acid ($C_6H_4(OH)_2COOH$), one of the six possible trihydroxybenzoic acids, occurs together with tannin (tannic or gallotannic acid) in gall-nuts, divi-divi, sumach, etc. It forms colourless silky crystals, having an astringent and slightly acid taste, readily dissolves in hot water and melts at $220^\circ C.$, at the same time decomposing into pyrogallol and

carbon dioxide. G. A. is a powerful reducing agent, readily absorbing oxygen in alkaline solution. With iron (ferric) salts a blue-black solution is produced, from which a black precipitate is finally deposited; use is made of this in the production of ink.

Gallicanism, a title used in theology to describe certain theories which, while recognising the primacy by divine right of the see of Peter, yet limit the power of the pope in temporal matters and in certain ecclesiastical matters. This attitude of resistance to the papal claims was particularly strong in France, and hence the name G. was given to it, while the church in France is known, in this connection, as the Gallican Church. G. can only be understood in connection with the rival theory, known as Ultramontanism, which now holds almost complete sway in the Rom. church. The first clear enunciation of Gallican principles was made in the Pragmatic Sanction (1269) in the reign of St. Louis, which declared that the government of the church should be carried out in conformity with the common law, the canons of the councils, and the statutes of the ancient Fathers. It was still further developed by Philippe le Bel in his conflict with Pope Boniface VIII. The most celebrated expression of G. is found, however, in the Four Propositions of 1682, drawn up by Bossuet and signed by thirty-five bishops and thirty-five other clergy. The propositions are: (1) That the pope's jurisdiction is in things spiritual and not in things temporal, and, therefore, that kings are not subject to ecclesiastical authority in such matters; (2) that the authority of a general council is at all times superior to that of a pope; (3) that the authority of the pope is to be limited by the canons of the Universal Church, and that the rules, customs, and institutions of the Gallican Church and kingdom remain intact; (4) that the judgment of the pope is not infallible unless it be afterwards confirmed by the whole church. These declarations, especially the last three, were frequently condemned by the papal authority, and Ultramontanism if not in its extreme manifestations is now substantially triumphant. G. throws much stress on the authority of the civil power, and has, therefore, been generally condemned as Erastian.

Galli-Curci, Amelita, Italo-American coloratura soprano, b. Nov. 18, 1889, at Milan, Italy; of mixed Italian and Spanish extraction; daughter of Enrico Galli. Educated at International Institute and Lyceum

High School, Milan; studied piano, composition and harmony at Royal Conservatoire, Milan. Appointed professor in conservatoire on graduation, at nineteen. Self-taught as a singer. Made début as Gilda in *Rigoletto*, at Costanzi Theatre, Rome, 1909; appeared at Barcelona and Madrid. Married Feb. 24, 1910, at Rome, Marquis Luigi Curci di Simeri. Toured in Italy and S. America. Made début in U.S.A. with Chicago Opera Association, at Auditorium, Chicago, as Gilda, Nov. 18, 1916; re-engaged for four seasons. Début in New York, Jan. 27, 1918, at Lexington Opera House, in *Dinorah*. Divorced, Jan. 6, 1920. Married, Jan. 15, 1921, at Minneapolis, Homer Samuels. Began performances with Metropolitan Opera Co., Nov. 14, 1921, as Violetta in *La Traviata*. Other parts she has sung are:—*Madame Butterfly*, Juliette in *Romeo et Juliette*, Lucia in *Lucia di Lammermoor*, Lakmé, Mimi in *La Bohème*, Elvira in *I Puritani*, and Leila in *The Pearl Fishers*. The Albert Hall, South Kensington, was packed on the afternoon of Oct. 12, 1924, when she made her first public appearance in England. The *Times* said, 'Generally, what one admires about Mme. G.-C. is that she can do so much with a voice confined to one colour, and that a pale one. She is herself the "pretty, pretty, pretty mocking-bird," of which she sings with such agility.' The public were wildly enthusiastic, good musicians cautiously critical. Her great reputation in England was made largely on gramophone records of her best vocal performances.

Gallieni, Joseph Simon (1849-1916), a Fr. soldier and colonial administrator whose fame rests on the great share he had in winning the First B. of the Marne (1914), b. at Saint-Béat in the Haute-Garonne, and received his military education at St. Cyr. He fought bravely in the Franco-German War of 1870, and increased French power in Senegambia, whither he was sent as captain in 1878. He served with distinction in the Sudan and crushed brigandage in Tong-King. He was made governor-general of Madagascar in 1896, and general of division on his return to France in 1899. In 1904 he was military governor of Lyons, and when the Great War broke out he had virtually retired. At that time he was Military Governor of Paris, and when the Ger. right wing under General von Kluck changed its direction from S.W. to S., thereby leaving Paris on its right, G. at once began to organise his command, and the troops sent by Marshal Joffre to augment it,

for a blow at the exposed German right wing when the psychological moment arrived. The threat was noticed by von Kluck, who halted and faced west to meet it. It was this movement that arrested the victorious German progress towards Paris. He became War Minister in 1915, but resigned in 1916, and d. in May of the same year. He wrote *Trois Colonnes au Tonkin*, 1894-95; *La Pacification de Madagascar*, 1900; *Neuf Ans à Madagascar*, 1908. See *Ellie, Le Général Gallieni*, 1900.

Gallienus, Publius Licinius, a Rom. emperor (A.D. 260-268), and coregent with Valerian, his father, from 253 until the latter's capture by the Persians in 260. G.'s reign is historically known as 'the time of the Thirty Tyrants,' for usurpers arose throughout the provinces. The most prominent, Aureolus, was proclaimed emperor in Illyricum, invaded Italy, captured Milan, and advanced on Rome. G. defeated him, but later, while besieging Aureolus in Milan, was himself put to death by his own officers. Claudius II. succeeded him.

Gallifet, Gaston Alexandre Auguste, Marquis de, Prince de Martignes (1830-1909), a Fr. general, b. in Paris, who distinguished himself in the Crimea, the Italian campaign (1859) and Mexico (1863). He commanded the 3rd Chasseurs d'Afrique in the Franco-German War (1870-71), winning fame by his heroic cavalry charge at Sedan. He earned a character for severity by his rigorous measures against the Communists. A recognised authority on army questions, he was made member of the Conseil Supérieur de la Guerre in 1885, and later decorated with the grand cross of the Legion of Honour. He retired in 1894, and entering the political arena, became War Minister in M. Waldeck-Rousseau's cabinet in 1899. He resigned in 1900, having quelled unrest in the army with a firm hand. See *Mes Souvenirs*.

Gallinaceous Birds, or Galliformes (Lat. *gallus*, a cock), constitute an order under which are included such birds as the Phasianidae, or pheasants, the Tetraonidae, or grouse, the Turnicidae, which include the bustard or button-quails of British India, the Megapodiidae, or mound-makers; the Cracidae, curassows and guans; and the Opisthocomidae, the curious hoatzins, or 'stinking-pheasants' of S. America. They are a widespread group, being found in almost every part of the globe, and they include almost every variety of plumage and shape from that of the common domestic fowl to the beautiful silver pheasant of S. China, which is em-

broidered as an emblem on mandarins' dresses.

Gallio, Junius Annæus, a Rom. proconsul of Achaia under Claudius, while St. Paul was at Corinth, A.D. 53-54. He was brother of Seneca and uncle of Lucan. Ill-health induced him to resign, and he was either put to death by Nero's order or committed suicide in 65. His name is now synonymous with an easy-going man, unwilling to shoulder responsibility.

Gallipoli: (1) A well-fortified seaport tn. in Southern Italy, 50 m. S. of Brindisi, built on a steep rock in the Gulf of Taranto. Its chief industries are tunny-fishing and the export of fruit, wine, and olive oil, which is deposited in basins excavated out of the solid rock. Pop. 14,500. (2) A Turkish seaport town on a peninsula at the north-eastern extremity of the European side of the Dardanelles. It has been Turkish property since 1357. The Venetians defeated the Turks here in 1416. Trades in corn, wine, and oil. The magazine and cellars built by Justinian and other ancient remains are in the vicinity. The town boasts two harbours and is the principal station for the Turkish fleet. It was fortified by the Eng. and French in 1854 and these fortifications were renewed and enlarged in 1878. The guns of G. command the Dardanelles just before the strait joins the Sea of Marmora. Pop., principally Gks., Turks, Armenians and Jews, about 35,000.

Gallipoli Campaign (1915-16). The political considerations which actuated the British Gov. in launching this much-criticised campaign in the Great War will be found under WAR, THE GREAT. The naval operations of the early part of 1915-6 in which the allied Anglo-French fleets endeavoured to force the passage of the Dardanelles are described under DARDANELLES. This article deals with the military or land operations in the peninsula.

The immediate purpose of the attack on the Dardanelles was to force the Straits in order to deal so effective a blow against the Turks that the pressure on Russia might be relieved and Bulgaria deterred from active adherence to the cause of the Central Powers. There is no doubt that had the attack been crowned with success Turkey would have been out of the war, whilst the check to Ger. aspirations in the S.E. (see also BAGHDAD RAILWAY) would have been so serious that the war might well have been curtailed by as much as two years.

Experience having taught the necessity of a combined land and water expedition, the British Cabinet

resolved to send out a force to Gallipoli to co-operate with the fleet. It was hoped by effecting a landing of soldiers on the European side of the peninsula, to storm Gaba Tepe (*q.v.*), Achi Baba (*q.v.*) and other formidable forts and thereby to facilitate the task of the ships in running the 40-mile gauntlet of the straits.

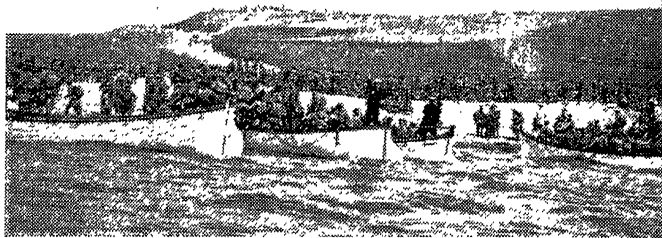
Cape Helles and Anzac Cove operations.—In the last week of April 1915 two divisions of the Australian Imperial Force and troops of the 29th Division effected a landing at Helles at the southern tip of the Peninsula and also at Anzac Cove (as it was subsequently called), which lies some 15 miles to the North of Cape Helles. The landing forms one of the most poignant episodes of warfare, the men scrambling through the water in the face of a murderous hail of bullets and seeking in every conceivable way to shelter themselves on an exposed beach offering nowhere any hope of throwing up defensive works speedily enough to avoid grave casualties. The Australian and New Zealand troops brilliantly scaled a series of steep cliffs and with the most dogged resolution gradually dug themselves in. In particular, the ruse by which the *Clyde*, an old troop-ship which, like the Wooden Horse of Troy, emitted masses of armed men, was brought close up to the shore and the men rapidly disembarked through an improvised gangway, will live long in the annals of the Great War.

The Battles for Krithia and Achi Baba.—It was decided, after the landing was effected, to make a combined advance by forces from both the south and the west. This attack eventuated in the sanguinary battle of Cape Helles and the battles for Krithia, the objective being the commanding height of Achi Baba. The attack, however, failed, the enemy being fully prepared, the terrain being ill adapted for offensive operations and the foe being constantly reinforced, as the attack dragged on, by ever more overwhelming numbers. A little ground however, even against heavy Turkish counter attacks, was gained during these battles and, in the course of other engagements, during May. In May, June and July the Turkish armies received a great accession of strength through Russia being forced to abandon her initial plan of co-operating with the French and British from the Black Sea. During these months heavy engagements were fought on May 6-8 (2nd Battle for Krithia) and June 4 (3rd Battle for Krithia). But, in view of the Turkish reinforcements, it was de-

cided to send out, in addition to the 52nd British Division, three more regular divisions, and two Territorial divisions of infantry. Among these latter were the Lancashire Fusiliers, and troops of the Manchester Infantry Brigade and East Lancashire Brigade.

The Suvla Bay Plan.—The new plan was to land troops at Suvla Bay and by a combined advance from there, and from Anzac Cove on the heights of Sari Bair, to cut the Turkish communications on the Gallipoli peninsula. The principal battles of this ill-starred plan, which began on Aug. 6, were the Battles of Sari Bair and Suvla (Aug. 6-15); but, although the Allied Forces were foiled

culties of transport and water supply nullified any advantage that might have been gained by this surprise. Far more casualties indeed occurred through dysentery from lack of water and general disorganisation of auxiliary services than through actual fighting, there being in fact but little resistance to the landing parties. The result of these failures was that the attempt to clear the European side of the Straits was abandoned; but it was made clear to the world, through official pronouncements, that the Allies would certainly remain on the peninsula. This they did until the end of the year, the troops digging themselves in and carrying on months of very trying trench warfare which



THE GALLIPOLI CAMPAIGN

Troops landing at Anzac Cove

[Topical Press

in their plan, they undoubtedly made such a drain on the Turkish forces that the repercussion was felt both in Syria and in Mesopotamia. Some have supposed, on what seems tolerably reliable evidence, that the attacking troops were within a very narrow margin of accomplishing their object and that if they had continued their operations these would have been successful within a very short space of time.

Sari Bair and Suvla.—The operations involved an advance from Anzac on the Sari Bair hills, a landing at Suvla Bay and an advance thence to join up with the Colonial troops. The advance on the Sari Bair heights had to be carried out over numerous ravines, and though the heights were reached, the Turkish troops, by heavy counter attacks, drove the Allied forces out again. Added to this check was the failure of the Suvla Bay operations. Troops were landed under cover of night, but grave diffi-

culties of transport and water supply nullified any advantage that might have been gained by this surprise. Far more casualties indeed occurred through dysentery from lack of water and general disorganisation of auxiliary services than through actual fighting, there being in fact but little resistance to the landing parties. The result of these failures was that the attempt to clear the European side of the Straits was abandoned; but it was made clear to the world, through official pronouncements, that the Allies would certainly remain on the peninsula. This they did until the end of the year, the troops digging themselves in and carrying on months of very trying trench warfare which

at least had the effect of greatly impairing the Turkish forces. The endurance of the Allied troops during this terrible campaign, with its casualties from constant sniping, occasional hand-to-hand engagements, disease through the trying climate and lack of water, is a veritable epic in British history.

Results of the Campaign.—The principal object of the Gallipoli operations was not effected and the evacuation, brilliantly carried out, in December 1915 and January 1916 brought the operations to a close. The conception was sound, but the means at the disposal of the Allies and the inevitable disorganisation resulting from local circumstances rendered its execution all but impossible. That the enemy—and especially the Gers.—believed the attack would succeed appears from a most indiscreet article written in 1915 by Maximilian Harden in the *Zukunft*, in which periodical the

writer prepares his readers for the Allies' success. It need hardly be said that the publication of this article resulted in the temporary suppression of this well-known periodical. Indirectly, however, the campaign achieved notable results in the wastage of the Turkish armies, which, apart from the victory over General Townshend's small force at Kut, never seriously hampered the steady pressure of the British and French in Palestine and the British in Mesopotamia, and the Russians in Armenia.

Casualties (approx.).—30,000 killed and died of wounds. 8000 missing and prisoners. 74,000 wounded. In all there were about 327,000 combatant troops and 141,000 non-combatant troops, employed from time to time. The maximum strength at any one time was about 85,000 combatant and 42,000 non-combatant troops.

Gallitzin (or Golitsuin.), Dmitri Augustin. See GALLITZIN.

Gallium, a metallic element first discovered by Lecoq de Boisbaudran in 1875 by spectroscopic analysis of a zinc blend from Pierrefitte in the Pyrenees. It occurs in blends from different localities and also, but in minute amounts, in other minerals. G. is obtained by dissolving the ore in acids, treating with zinc to precipitate the foreign metals, re-dissolving the precipitate in hydrochloric acid, and throwing out the G. in the cold with zinc. Subsequent fractionation yields G. in the pure state. In properties G. is allied to aluminium. It has a characteristic spectrum—two lines in the blue and violet. Atomic weight, 70; atomic number 31; symbol Ga; melting point, 30.1°. It is identical with Mendeléef's hypothetical eka-aluminium. G. is very widely distributed, but usually in very minute quantities. It seems likely to find industrial application in electric lamps and in optical apparatus.

Gall-midges are minute dipterous insects belonging to the family Cecidomyiidae, which live in the different parts of plants or under the bark of trees. Certain species of *Miastor* and *Oligarces* possess the remarkable power of reproduction whilst in the larval state. *Cecidomyia destructor*, the Hessian fly, is injurious to cereals, and is a great pest in some parts.

Gallon, an old English measure of capacity, which underwent much alteration until the present imperial G., containing four quarts, was fixed by Act of George IV., 1824, as the standard unit of measure for liquids throughout the United Kingdom. This imperial G. contains 10 lb.

avoirdupois of distilled water = 277.274 cubic in. A wine G. in the reign of Queen Anne (1707) held 231 cubic in., the same measure of capacity as the G. in America to-day.

Galloway, a fertile and extensive dist. in the S.W. of Scotland, comprised in Wigtonshire and the stewartry of Kirkcudbright. It is bounded by the sea, the Solway Firth, and the R. Nith, and is divided into Upper and Lower G. Famed for its breed of small horses and hornless black cattle, with dairy-farming as its principal industry. The climate is mild, and there is much diversity of scenery.

Galloway, Joseph (c. 1731-1803), American lawyer and anti-nationalist; b. in Kent Co., Maryland; early removed to Philadelphia. Member of the Pennsylvania Assembly during most of the period 1757-74. He was against proprietary gov., and advocated the erection of Pennsylvania into a royal province. He married a daughter of Lawrence Growdon, Speaker of the House, and was himself Speaker 1766-74. Opposing the ideas of the Revolution, he proposed, as a member of the Congress of 1774, a scheme of gov. consisting of a president-general, appointed by the king, and a grand council elected for three years by the various assemblies of the colonies. This was rejected by a narrow majority. In Dec. 1776, G. joined the British army under Sir Wm. Howe, and he became supt. of prohibited articles at Philadelphia on its capture. He accompanied the army to New York. In 1778 he went to England, and his estate of £40,000 was confiscated by Congress. He wrote many pamphlets—on American and Biblical subjects. Died at Watford, Herts, Aug. 29.

Galloway, Mull of, a rugged and mountainous promontory, situated at the south-western extremity of the Galloway peninsula, and the most southern point of Scotland. On its eastern side it rises to a height of 210 ft., crowned by a lighthouse 60 ft. high. Small horses, known as Galloways, are bred here, also large numbers of sheep and cattle, chiefly for the English market.

Gallowglass (Irish *giolla*, a man-servant), the heavy-armed foot soldiers or chieftains' retainers who fought in the old Irish wars. Armour-bearers in the Scottish Highlands were once so called and are mentioned in Shakespeare's *Macbeth* as coming, with Kernes, from the western isles of Scotland.

Galls, the excrescences or tissue-bodies produced in plants by the presence of parasitic insects or fungi; they vary greatly in form, some of

them being complicated structures resembling fruits and flowers. See GALL-FLY.

Gall-stones, Cholelithiasis, Hepatic Calculi, or Biliary Calculi. G. are found in the gall bladder and biliary ducts of man and most vertebrate animals, being especially common in oxen. Their size varies from that of small gravel to large stones quite 5 in. in length. When large, the stones are usually found singly and of a rounded or oval shape. The smaller, wedge-shaped ones are generally more numerous. Their colour ranges from white to black, but is generally brown. Chemically they are a compound of lime and bile pigment, with traces of mucous and phosphatic earths. G. are rare before puberty, and most common after thirty years of age. They are usually associated with a sedentary life and excesses or irregularity of diet. They are frequently found in cases of cancer of the liver and adjacent parts. While still in the gall bladder, the stones give rise to no symptoms—in some cases patients may never have any indication of their presence. It is only when the stones leave the gall bladder and escape into the cystic duct that inflammation is set up in the gall bladder and biliary passages.

Cholecystitis.—When the stones enter the bile passages, they give rise to biliary colic, that is to say, intense pain on the right side of the abdomen, below the ribs. This attack is followed by jaundice within twelve to forty-eight hours. The pain usually lasts until the stone is passed out of the duct or falls back again into the gall bladder, which may take place in a few hours or only after several days. The attacks may recur from time to time as new stones leave the bladder. The treatment consists in the immediate relief of pain by the application of heat, fomentations, hot bottles, and other means, as well as the administration of hypnotics, either by the mouth or through the skin.

The prevention of biliary colic consists in giving considerable quantities of boiled water or weak alkaline mineral waters. Considerable benefit results from taking four ounces or more daily of olive or other oil. If, despite internal treatment and regulated diet, the trouble still continue, operative measures must be resorted to, as they alone will give relief.

Gallus, Ælius, a learned jurist and contemporary of Cicero. A single excerpt is given in the *Digest* (50, tit. 16, s. 157) from a treatise he wrote on the signification of terms (*Gellius*, x. 22).

Gallus, C. Aquilius, a Rom. eques,

was made prætor in 66 B.C. He was a pupil of Q. Mucius Scaevola the Pontifex, and became celebrated as a jurist. His writings were edited by Servius Sulpicius, his pupil, and himself a famous jurist. Cicero eulogised G. in an oration for having promulgated an edictal rule on fraud in matters of buying and selling.

Gallus, Caius Cornelius (66–26 B.C.), a Rom. poet, b. at Forum Julii (Fréjus) in Gaul, and the friend of Virgil and Ovid. Augustus sent him as general to Egypt, where he defeated Antony's forces and captured and imprisoned Cleopatra. Upon her death (30 B.C.) and the conversion of Egypt into a Roman province, G. was made first governor. Four years later he was deposed and exiled by order of Augustus, but preferring death to dishonour he committed suicide. He wrote four books of elegies not now extant. He was the hero of W. A. Becker's well-known story *Gallus*, 1838, English translation by Metcalf (London, 1866).

Gallus, Julius Aquila, a jurist under the empire of uncertain date. The *Digest* contains two excerpts from his work, *Liber Responsorum* (26, tit. 7, s. 34; and 26, tit. 10, s. 12).

Gallus, Trebonianus, a Roman emperor (A.D. 251–54), is said to have been treacherously concerned in the defeat and death of Decius, whom he succeeded. After his accession, G. concluded a dishonourable peace with the Goths, conceding them a fixed annual tribute and allowing them to retain their captives and plunder. He was killed by his own soldiers when on the march to suppress another Gothic invasion.

Galluzzo, a vil. and com. of Italy in the prov. of Florence, Tuscany. It lies 2 m. S.W. of Florence. Pop. (commune) about 19,000.

Gally, Merritt (1838–1904), an American inventor, b. near Rochester, New York. He was ordained Presbyterian minister in 1866, but resigned owing to voice trouble, and interested himself henceforward in mechanics. He took out more than four hundred patents, many connected with printing machinery. His inventions included: the University printing press, a machine for the manufacture of printers' types from cold metal by swaging, and the composite swage-locked type-bar or linotype. He was also the inventor of the 'orchestrome,' and made many productive experiments with automatic musical instruments.

Galston, a tn. in the co. of Ayr, Scotland. It stands on the Irvine, E. of Kilmarnock, and is engaged in coal-mining and the manuf.

of muslin and cotton goods. Pop. 4977.

Galsworthy, John (b. 1867). An Eng. novelist and dramatist. b. at Kingston Hill, Surrey. Educated at Harrow and at New College, Oxford, where in 1889 he took an honours degree in Law. Instead of going to the Bar, like his father, from 1881 to 1886 he travelled round the world, and on the sailing ship *Torrens* met Joseph Conrad. In 1895 G. first began to write. In 1898 he published a book of stories, *From the Four Winds*, under the name John Sinjohn; in 1898 the novel *Jocelyn*, in 1900 another novel, *Villa Ruben*, and in 1900, *A Man of Devon* and other tales. *The Island Pharisees*, a novel published in 1904, was the first book to be published under his own name. In 1906 the novel *The Man of Property* was published. This novel, the first of that great series of novels *The Forsyte Saga* and *The Modern Comedy*, is the most dramatic of his novels, and the complete Saga probably his greatest work. He himself says of the Saga that it 'cannot be absolved from the charge of embalming the upper middle class life,' and in the complete success of this undertaking consists the greatness of the *Forsyte Saga*.

In 1906 G. first became known as a dramatist with the play *The Silver Box*. In 1907 came the comedy *Joy* and the novel *The Country House*. A volume of sketches, *A Commentary*, was published in 1908, and in 1909 the important novel *Fraternity*; also during that year the play *Strife* was first performed, to be followed in 1910 by *Justice*, and another volume of sketches, *Molloy*, and in 1911 by the novels *The Patrician*, *The Inn of Tranquillity* (further sketches) and the play *The Little Dream*. In 1912 he published a book of verse, *Moods, Songs and Doggerels*, and the original tragic-comedy *The Pigeon* and the play *The Eldest Son* were first performed. The novel *The Dark Flower* and *The Fugitive*, a drama, came in 1913; the novel *The Freeland* and the play *A Bit o' Love* in 1915; in 1917 *Beyond*, a novel, and the play *The Foundations*, in 1918 *Indian Summer of a Forsyte*, a delicate short story, later included in the 'Forsyte Saga,' *The Five Tales, Another Sheaf, The Burning Spear*, and *The Saint's Progress*, in 1919. In 1920, *In Chancery*, the second volume of the 'Forsyte Saga,' was published, and in 1921 the last volume of the trilogy, *To Let*. The plays *The Skin Game* and *Strife* were first performed in 1920, and in that year *Tatlerdemation*, a collection of war stories, was pub-

lished; the comedy *A Family Man* was produced in 1921, and in 1922 *Loyalties and Windows*. More tales, *Captures*, appeared in 1923, and in 1924 *Old English*, an earlier story dramatised, was first performed, and later in that year the play *The Forest*. At this time also *The White Monkey*, the first book of the second trilogy, *The Modern Comedy*, was published, to be followed by the second book, *The Silver Spoon*, in 1926, in 1927 by two interludes, later to be included in the second trilogy, and in 1928 by the last book of the cycle, *Swan Song*. Another play, *The Show*, was produced in 1925, and in 1926 the drama *Escape*. A selection of earlier and unpublished poems, *Verses New and Old*, was published in 1921, in 1927 a book of essays,



JOHN GALSWORTHY

Castles in Spain and other Screeds, and *The Way to Prepare Peace*; *The Roof*, a play, in 1929, and in 1930 a book of short stories, *On Forsyte 'Change*, and *Soames and the Flag*.

G. is sometimes considered to use too much propaganda in his works, particularly in his plays, but he uses it rather as a framework than as the purpose of his plays. He is ironical but humanitarian, reserved—and this reveals itself in reticence and sparseness of words in dialogue—and although seemingly oppressed by the sadness of life, he has a sense of humour, at its best when ironical, and a great appreciation of beauty. His work is perhaps influenced by Turgeniev and Maupassant, whom he read a great deal in his youth, but it is essentially Eng. *The Silver Box* is a play typical of his dramatic methods, and *The Man of Property* contains the essence of his greatness as a novelist.

Galt, Sir Alexander Tilloch (1817-93), a Canadian politician, *b.* in Chelsea. In 1835 he went to Canada, and in 1849 sat in the Canadian parliament. From about 1858 to 1862 he was the Minister of Finance, and in another administration from 1864 to 1866, and eventually became first Finance Minister of the Dominion of Canada. From 1880-83 he was in England, High Commissioner of the Dominion. He wrote *Civil Liberty in Lower Canada*, 1876; *The Future of the Dominion of Canada*, 1881.

Galt, John (1779-1839), a Scottish novelist and dramatist, son of a sea captain, *b.* at Irvine, Ayrshire. He first worked unsuccessfully in London, then travelled extensively on the Continent, where he made friends with Byron. Returning to England he published 'Letters from the Levant' in *Blackwood's Magazine*; *The Ayrshire Legatees*, 1820; and his masterpiece, *Annals of the Parish*, in the following year. He became secretary for the Canada Company, but returned to England a ruined man, and devoted himself henceforward to literature. He published his *Autobiography*, 1833; *Literary Life and Miscellanies*, 1834; and a number of novels, including *The Provost*, *Sir Andrew Wylie*, and *Lavrie Todd*. He married the daughter of Dr. Tilloch, the proprietor of the *Star* newspaper, for which he worked. G. was a prolific but unequal writer, unrivalled in his delineation of life in small Scottish towns. An edition of his works, with introduction by Crockett, was published in 1896.

Galton, Sir Francis (1822-1911), the celebrated anthropologist, cousin of Charles Darwin, was *b.* at Deddeston, Warwickshire. Educated at King Edward VI.'s Grammar School, Birmingham, he became medical student at Birmingham Hospital and King's College, London, and took his degree at Trinity College, Cambridge (1844). In 1850 he explored unknown parts of S. Africa, embodying his experiences in his *Narrative of an Explorer in Tropical South Africa*, 1853 (which gained for him the Royal Geographical Society's gold medal), and *Art of Travel*, 1855. He was made member of the Meteorological Council, general secretary of the British Association (1863-68), president of the anthropological section (1885 and 1887), president of the Anthropological Institute (1885-86). He devoted himself to the study of heredity, and endowed a research fellowship for the study of eugenics in the University of London (1904). He received a knighthood in 1909. His principal works are: *Meteorographica*, 1863; *Hereditary Genius*,

1869; *English Men of Science, their Nature and Nurture*, 1874; *Human Faculty and its Development*, 1883; *Natural Inheritance*, 1889; and *Memoirs of My Life*, 1908.

Galuppi, Baldassare (1703-85), a famous Italian composer, particularly noted for his comic operas, *b.* at Burano, near Venice. He also wrote sacred music, and sonatas for the harpsichord. He has been called the 'father of Italian comic opera.' See Fétis, *Biographie Universelle des Musiciens*.

Galvanauskas, Ernest, Lithuanian statesman, *b.* Nov. 7, 1882, at Vabalninkai. Educated at St. Petersburg and Liège as mining engineer. Imprisoned 1906 for political plotting; escaped to Belgium 1908. In the Great War fought in the Serbian army and was also in France. On Lithuania gaining independence, was a member of its delegation to Peace Conference. Has held premiership; also Ministries of Foreign Affairs, Finance, and Communications. Minister in London and at The Hague, 1924-27.

Galvani, Luigi (1737-98), an Italian physiologist, *b.* at Bologna, and in spite of his own wish to enter the church, was educated for the medical profession. He attained great fame as a comparative anatomist at the University of Bologna, where he became a lecturer. His greatest discovery was published in the treatise called *De Viribus Electricitatis in motu Musculari Commentarius*. He was not a brilliant teacher, but owes his fame chiefly to his research work. The word galvanism is derived from his name. His whole research was directed towards ascertaining the relation of animal muscle to electricity. He refused in 1797 to take the oaths of the government of the new Cisalpine republic, and was deprived of his chair at the university. Before he could be reinstated he died.

Galvanising, the name applied to the process of coating iron with zinc to preserve it from rusting. The iron, thoroughly cleaned by scouring with dilute acid and sand, is dipped into a bath of molten zinc covered with ammonium chloride to act as a flux, whereby a protecting layer of zinc-iron alloy is formed on the outside. G. was first practised about 1837; iron so treated withstands the action of air and moisture better than tinplate (*q.v.*), hence it is extensively used for wire-netting, corrugated roofing, cooking-vessels, chains, water tanks, etc.

Galvanism, a term applied to the method of alleviation of pain and cure of disease by means of a current of electricity. The current may be

obtained from a battery of cells, or by means of a switchboard where electrical power is available. An alternating current may be used instead of a direct current, and is often of much value for therapeutic purposes. The terminals of the source of the current are connected to metallic electrodes which are covered with some absorbent material. To make the resistance of the skin of the patient as low as possible the electrodes and the skin are well wetted with a solution of sodium bicarbonate. The electrodes are applied to the body and the current passes from the one to the other through the body. Great care must be taken to prevent the metal touching the skin, and to avoid too strong a current.

Galvanometer, an instrument employed in electrical work for the detection and measurement of currents. Gs. may be divided into two classes: (1) direct current Gs., (2) alternating-current Gs.

Direct Current Galvanometers.—One type of direct-current G. depends for its action on a discovery made by Oersted. He found that when a wire traversed by an electric current was held directly over and parallel to a suspended magnetic needle it caused the needle to be deflected. A reversal of the direction of the current in the wire reversed the direction of the deflection. Ampère gave the following *memoria technica* by which the direction of deflection may be remembered: Imagine an observer swimming with the current and looking at the needle. The N. pole is deflected to his left. Suppose (Fig. 1), a

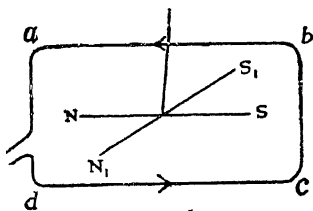


FIG. 1

magnetic needle NS is pivoted at the centre of a rectangular coil of wire *abcd* with its plane in the magnetic meridian. When a current flows in the wire in the direction of the arrows, the application of Ampère's rule shows that the parts of the wire above and below the needle conspire in deflecting the needle into the position N_1S_1 . The needle takes up a position of equilibrium in which the deflecting couple due to the magnetic field pro-

duced by the current is balanced by the restoring couple due to the horizontal component of the earth's magnetic field. The effect of the current on the needle will obviously be increased by increasing the number of turns of wire in the coil. For a given number of turns in the coil the deflection due to a given current is also increased by winding the wire closer to the needle. From these principles it will be easy to understand the action of the earliest form of G. or multiplier invented by Schweigger a short time after Oersted's discovery. The apparatus (Fig. 2) consists of a cardboard

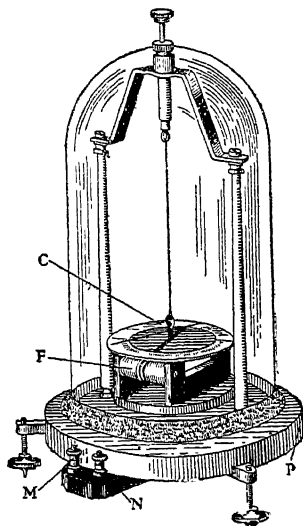


FIG. 2

frame F attached to a wooden base P resting on three levelling screws. A large number of turns of insulated copper wire are wound around the frame, inside which a thin magnetised needle is suspended by means of a filament of silk. The ends of the wire terminate in binding screws M, N. Above the frame is a graduated scale C with a central slit parallel to the direction in which the wire in the coil is wound. The deflection of the needle is indicated by a very slight pointer, attached to the suspension, moving over the scale. In using the instrument, the direction of the slit in the graduated circle is adjusted so that it lies in the magnetic meridian.

The plane of the coil is then in the magnetic meridian, and the pointer lies over the line joining the two zero marks on the scale. This simple form was soon superseded by one of much greater sensitiveness. The deflection of the needle is resisted by the magnetic field due to the earth. If the restoring couple due to the earth's field is reduced, the deflection produced by a given current must be increased, i.e. the sensitiveness of the instrument is improved. An *astatic* pair of magnets produce this result. The magnets are attached at their centres to a piece of brass wire, *ab*, so that they cannot move relatively to each other. The axes of the magnets are parallel, and their N. poles point in opposite directions. If the magnets are of equal strength, the directive force on the system due to the earth's field must be zero. The lower magnet is suspended inside the coil, and the upper magnet outside. Reference to Fig. 3 will show that the resultant

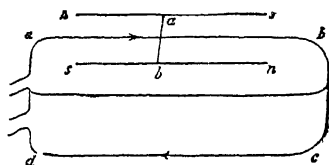


FIG. 3

effect of the current in the coil is to deflect the left side of the system out of the plane of the paper. Even the weakest currents would cause a deflection of 90° if the earth exerted no directive influence on the pair, but in practice one needle is not so strongly magnetised as the other, so that there is always a *small* controlling couple acting on the system due to the earth's field. The sensitiveness of the simple G. of Schweigger may also be increased by employing an external controlling magnetic field. This is produced by placing a magnet above and parallel to the plane of the coil with its N. pole pointing N. The field due to the magnet is then opposite in direction to the field due to the earth. By adjusting the distance of the magnet from the suspended needle, the resultant controlling couple can be made very small. In the *mirror galvanometer* Lord Kelvin made the important improvement of reducing the size of the needle and attaching it to the back of a very small mirror, the two being suspended by a single silk fibre. The mirror is made of silvered microscopic glass of about 5 mm. diameter, and the magnetic needle is

cemented to the back of it. The deflection of the needle is observed by reflecting the image of an illuminated wire or the filament of an electric lamp upon a fixed scale. The distance of the mirror from the scale is usually about 1 metre. This is a very sensitive method of detecting the deflection of a suspended system. It is evidently equivalent to using a weightless pointer several feet long. An astatic system used in conjunction with a mirror G. gives a highly sensitive instrument. Later patterns of this type of G. include the Paschen and the Broca Gs. Some idea of the sensitivity of the former may be gauged from the fact that a current of one-millionth of an ampere will produce a deflection of from 30,000 to 50,000 mm. on a scale 1 metre away.

Formerly a serious disadvantage of all moving magnet Gs. was that they were affected by variations in the intensity of the external magnetic field, and although shielded by iron cases they were not satisfactory in the vicinity of electrical machinery, trams, etc., and this led to their being superseded by moving coil galvanometers for general use, since the latter are not affected in this way. During the past few years a new alloy of iron and nickel, known as Mumetal, has been discovered to be quite successful in shielding moving magnet Gs. from external magnetic fields, and their superior sensitiveness may now cause a reaction in their favour. The *moving coil galvanometer* was first devised by Lord Kelvin for use as a telegraphic signalling instrument. In this instrument (Fig. 4) a light movable coil is suspended between the poles of a powerful horseshoe or ring-shaped magnet with its plane parallel to the plane of the field. The suspending fibre is made of thin phosphor-bronze strip which also serves to lead the current into the coil. The current leaves the coil by a spiral of the same wire attached to the lower part of the coil. When a current flows through the coil it tends to set itself with its plane perpendicular to the lines of force of the field. The controlling force is the torsion of the suspending strip. To prevent the moving system oscillating about its final position of equilibrium, and thus to save time in making observations, the galvanometer is 'critically damped.' This is achieved by connecting a suitable resistance in series (or in parallel in many cases) with the galvanometer coil. When the coil rotates, induced currents are set up in it and their effect is to bring the coil to rest very rapidly. If the moving system takes up its position of equilibrium without any oscilla-

tions, it is said to be *dead beat* or *aperiodic*. For some purposes, however, the G. is required to have just the opposite property, *i.e.* there must be as little retardation as possible to the needle or coil when set in motion under an impulsive blow. Such a G. is called *ballistic*; it is used for measuring or comparing quantities of electricity of the order of very small fractions of a coulomb. For the measurement of large currents a *tangent galvanometer* is used. At the

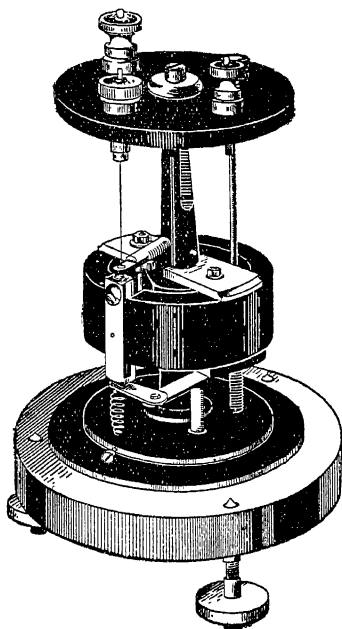


FIG. 4

centre of a circular coil a small needle whose length must not be greater than one-tenth the radius of the coil is suspended. The G. is adjusted with the plane of the coil in the magnetic meridian. The deflecting force due to the current is perpendicular to the controlling force due to the earth's field, and is therefore proportional to the tangent of the angle of deflection of the needle. The force due to the current is directly proportional to the strength of the current, which is therefore proportional to the tangent of the angle of deflection of the needle.

This law is true only when the needle lies in a controlling field which is uniform in strength and direction.

Alternate Current Galvanometers.—Obviously, the moving needle or coil G. of the patterns described would be unaffected by the passage of an alternating current through it. The Duddell thermal G. is an extremely sensitive instrument for the detection and measurement of alternating currents. The current to be measured is passed through a strip of metal of high resistance mounted on glass; over the strip is suspended a closed loop of bismuth and antimony forming a thermo-electric circuit. This loop is suspended by a fine quartz fibre in a strong magnetic field. One junction of the thermocouple is held just over the resistance strip. The passage of an alternating current through the strip generates heat, which is radiated to the thermojunction, thus producing a thermo-electric current. The loop carrying the continuous current is deflected by the magnetic field. For further information and for a description of other patterns of Gs. the reader is referred to *Dictionary of Applied Physics*, vol. 2, 1922.

Galveston, a port of entry and cap. of G. co., Texas, U.S.A., on G. Island (N.E.), at the mouth of G. Bay. Next to New Orleans it is the most important port on the Gulf of Mexico, and trades with Great Britain, Germany, France, Cuba, Mexico, and Brazil. Its harbour, which is the best in the State, has over twelve feet of water on the bar at low tide. The chief export is cotton, others are grain, timber, cattle, hides, oil-cake, petroleum. There are iron-foundries, machine-shops, cigar-factories, grain elevators, and manufactures of flour, ice, rope, bagging, cotton-seed oil, cotton-cake, etc. There are regular steamship sailings to all parts of the globe. It is a Catholic bishop's see, and has several academies. Settled in 1837, it was captured by the Federals (1862), and retaken by the Confederates (1863). A fire in 1885 caused much destruction, and worse havoc was wrought by a storm and influx of the sea (1900). The precautions taken against a similar disaster include a sea-wall $4\frac{1}{2}$ m. long and the raising of the city's level. Pop. 52,938.

Galway: (1) A maritime co. of Connaught, W. Ireland, bounded W. by the Atlantic (coast much indented); S. by Clare county; S.E. by Tipperary, Lough Derg, and the Shannon; E. by King's county and Roscommon; N. by Roscommon and Mayo. Among the islands off the coast are Inishbofin, Inishark,

Gorumna (N.W.), and the Aran Is., which form a natural breakwater at the entrance to G. Bay (about 20 m. broad) between G. and Clare counties (S.W.). The surface is mountainous in the W., with the Twelve Pins group and the Mamturk Mts. (over 2300 ft.). The Slieve Baughta (Aughty) Mts. come further S. G. contains Lough Corrib and part of Lough Mask. The chief rivers are the Shannon and its tributary the Suck, the Black and the Clare. There are wild moorland tracts in the W., such as Joyce's Country, Connemara (noted for marble), and Iar-Connaught. A branch of the Grand Canal connects the Shannon Harbour with Ballinasloe. Agricultural produce, wool, and marble are the chief exports. Limestone is plentiful, and copper ore is found at Roundstone (S.W.). Area about 2376 sq. m. Pop. 170,000. (2) Cap. of above, parl. bor. and seaport on G. Bay, 115 m. W. of Dublin, at the mouth of the Corrib. Claddagh village, the fishermen's quarters, is close by. Coarse linens and stockings are the chief manufactures, and kelp on the coast. G. is the seat of a Roman Catholic bishop. Queen's College (founded about 1845) was renamed University College (1908). Pop. 13,000. See Hardiman, *Hist. of Galway*, 1820.

'Galway Castle,' a Union Castle liner which, during a voyage to S. Africa in Sept. 1918, was torpedoed by a Ger. submarine without warning. She had a hundred persons on board, but although the ship was almost cut in two by the force of the explosion, all these persons were rescued by vessels of the Royal Navy and landed at Plymouth.

Gama, Vasco da (1469-1524), a Portuguese navigator. He early established a reputation as a fearless sailor, and followed closely in the footsteps of Prince Henry of Portugal. In 1497 he was despatched with three vessels to attempt to round the Cape. With incredible difficulties to face he at last succeeded in doing so, and continued his journey across the Indian Ocean to Calicut. Here he established a settlement, but had great difficulty in cutting his way out of the harbour. He returned to Portugal in 1499, and was raised to the nobility. At the same time an expedition was despatched to plant a Portuguese colony at Calicut, but the atrocities of the natives caused G. to be sent out there again. He established a number of stations on his way there and finally returned with rich booty to Portugal in 1503. It was not until 1524 that his services were again required. The atrocities at Calicut had again become excessive, and G.

was again despatched. He succeeded in restoring Portuguese prestige, but on the way back he died at Cochín. See Camoens, *Three Voyages of Vasco da Gama*; and *Journal* of his first voyage.

Garniel, a Pharisee. According to the accounts of the life of St. Paul in the Acts of the Apostles, he was the teacher of that saint. He was a well-known and influential member of the Sanhedrin. He was the grandson of Hillel. As a member of the school of Pharisees he was more tolerant, peaceful, and broad-minded than the other members. He had a great liking for Greek and studied well that language and the manners and customs of the people. He does not seem, on any reliable authority, ever to have been inclined towards Christianity, except for his defence of St. Peter and John (Acts V. 34). The stories which we find nowadays to that effect are the aftermath of the influence of Paul.

Gambetta, Léon Michel (1838-82), a Fr. statesman, b. at Cahors, being of Jewish extraction. He became a member of the Paris bar and sprang into notoriety almost immediately. He advocated very



LÉON MICHEL GAMBETTA

Liberal ideas, and was in 1869 elected as deputy both for Marseilles and for Belleville by the ultra-extremist party. He was largely instrumental in causing the proclamation of the republic after the disaster of Sedan. The provisional gov. which was formed to conduct affairs after this defeat was largely under his influence, and he held the portfolios of the Ministry of the Interior. He

conducted the defence of Paris, but after the beginning of the siege he escaped from Paris by means of a balloon and conducted the war from outside. He struggled on bravely to the end and was bitterly opposed to any surrender, and he was finally repudiated by the Fr. provisional gov. and fled to Spain. He was soon, however, elected as a deputy, and from 1872 onwards he took his place as the leader of the Republican party, putting forward an advanced programme for them. He was instrumental in preventing the attempted royalist restoration under the Duc de Broglie in 1877, and quarrelled very badly with President Macmahon. For making statements about Macmahon which were held to be libellous he was arrested and imprisoned, but finally his popularity was so great that he gained practically a victory over the president, who resigned. In 1878 he became president of the Chamber of Deputies, and two years later, premier. His revision of the constitution was, however, rejected and he retired. He died two years later. See *Lives* by Reinach and Tournier.

Gambia, a British crown colony and protectorate on W. coast of Africa. It extends for about 250 m. along each bank of the R. Gambia and has an area of about 4500 sq. m. The Fr. have been given access to the navigable parts of the river. The chief town is Bathurst, on the Island of St. Mary. It is administered by a Governor and Executive and Legislative Council. There are several elementary and secondary schools run by the gov. and the Church. Internal communication is maintained by steamers or launches; there are no local railways. Bathurst is connected with St. Vincent and Sierra Leone by cable and with towns in the Protectorate by wireless. The principal exports are ground-nuts, hides and skins and palm kernels; the principal imports are tobacco, wines, sugar, tea, soap, oils, metal, cotton goods, boots and shoes, coal, etc.

G. was discovered by the early Portuguese navigators, but no settlement was made. Later various merchant companies obtained charters and settled along the river banks. From 1807 G. was controlled from Sierra Leone, but in 1843 it was made an independent Crown Colony. In 1866 it was included in the West African Settlements, but was again a separate Crown colony in 1888. Pop. about 200,000.

Gambier, James, Baron (1756-1833), an Eng. admiral, b. in the Bahamas. He entered the navy and rose rapidly

in its service. He served under Lord Howe in 1794, and commanded the fleet which bombarded Copenhagen in 1807. He was present with Cochrane at the battle in Aix Roads in 1809, but refusing to act on that sailor's advice was tried by court martial and honourably acquitted. He was made an admiral of the fleet in 1830, and died three years later. His *Memoirs* were published in 1861 by Lady Chatterton.

Gambit, see CHESS.

Gambling may be broadly defined as the playing at games of chance or wagering on some fortuitous event for money or money's worth. At the common law all games were allowed provided they were played fairly. When the legislature first intervened is not quite certain, but once having done so it classed together as illegal all sorts of games and pastimes such as cards, dice, cock-fighting and races, without regard to the absence of any inherent common element. Perhaps the earliest instance of State interference was the proclamation issued by Edward III., who is recorded to have looked with disfavour on games of stones, bars, handball, football, cockfighting *et alios vanos ludos*, not because of anything vicious in the games *per se*, but apparently because he found that his subjects preferred such peaceful games to the 'noble sports of war.' The proclamation was therefore made, according to some historians, not out of regard for the moral welfare of the people, but in the interests of recruiting for the army. Statutory restrictions on games and gaming are to be found as early as the reign of Richard II. The object of these and subsequent statutes has generally been to punish as public nuisances all manner of games of chance by referring the persons who play at them to the category of rogues and vagabonds. Old writers assign the quaintest reasons for this legislative interference. Brandt cites the opinion of the older divines to the effect that games and betting were prohibited because 'we neither bless God nor look to receive a blessing from Him' when occupied in such pastimes. In regard to the later statutes against gaming and wagering, including the prohibition of lotteries, it is to be noted that the principle varies according as the statute is creating a criminal offence or merely declaring that certain contracts shall not be civilly enforceable. (As to this see also GAMING.) G. or wagering contracts are unenforceable simply because there is no legal consideration. (See CONSIDERATION, CONTRACT.) The principle underlying the Acts which punish certain

forms of G. as indictable offences is by no means clear. Some of the statutes now repealed were mainly directed at *excessive* gaming. Others seem to have proceeded on the general assumption that playing at certain games usually tends to cheating. All cheating, however, is punishable at common law, whether in a game or in any other transaction, if anyone is thereby defrauded of anything. As the criminal law now stands a number of games are expressly forbidden avowedly on the principle that they are games of chance. The Gaming Act (1845), the Betting Act (1853), the Gaming House Act (1854), the Vagrancy Act (1873), and the Street Betting Act (1906), without expressly defining gaming, strengthen the common law against the keeping of common gaming houses or betting in the streets or other public places, presumably on the common law principle that such practices are public nuisances in that they promote cheating and other corrupt practices. But the element of chance as the deciding factor is apparent in most of them. The Act of 1845 allows as sufficient evidence in support of a prosecution for keeping a common gaming house that the games played there are such that the chances are not alike favourable to all the players. The Vagrancy Act, 1873, speaks of 'pretended games of chance,' while the Act of 1853 prohibits betting in 'certain places for money or other valuable thing on any event or contingency relating to any horse race or other race, fight, game, sport, or exercise.' Betting on horse races is not in itself unlawful; it is rather the habitual user of certain places, especially houses, for a betting business that is aimed at. Members of a *bona fide* club may bet with each other at their club, and apparently betting in the streets could only be punished if any person were found frequenting or loitering in the streets or other public places for an appreciable time for that purpose.

Certain games are expressly made unlawful by a series of statutes: they are ace of hearts, pharaoh (faro), basset, hazard, roulette, passage, and every other game played with dice or any instrument, engine, or device in the nature of dice, having figures or numbers on it, but not backgammon or games played on backgammon tables. The prohibition is wide enough to include any card game of mere chance, and that form of baccarat called *chemin de fer* (q.v.) has been vetoed since 1895. In the celebrated case of *Jenks v. Turpin* (1884), where a divisional court upheld a magisterial decision which

punished the playing of *baccarat banque* in a gaming-house, the only substantial argument urged against the inclusion of this game was that the element of skill consisted in the player determining whether he would stand on the card dealt to him or take another. Considerable public comment was evoked by a more recent decision of the courts against progressive whist drives. The principle of the decision was that the element of chance altogether predominated over that of skill, especially as after the first hands were played, no player knew whom his partners were going to be for the rest of the drive, and further that weak or unskilful players might be indiscriminately pitted against strong players. The craze for 'limericks' in certain publications was also suppressed by decisions which declared that such competitions were mere lotteries. All lotteries are public nuisances according to the English law. The Lotteries Act, 1823, punishes as rogues and vagabonds persons who sell tickets or chances in lotteries authorised by foreign potentates or states, and an Act of 1836 provides penalties for advertising lotteries. Selling packets of tea or other things with coupons entitling the buyer to a prize constitutes a lottery, as are also missing word competitions and sweepstakes on horse races.

There can be no two words about the popular love of G. at all times and in all countries. Some races are, no doubt, more prone to G. than others, but as long as human nature remains as it is, G. will assuredly endure. The periodical raiding of West-End clubs and the organisation, especially since the Great War, of sweepstakes offering immense prizes are the plainest evidence of this psychological fact (see CALCUTTA SWEEPSTAKE). Opinions may well vary as to whether G. is inherently a vice. It is certainly neither the function of the legislature nor its practice to pass Acts based on any such assumption. Rather are the frequently unhappy results the feature on which legislators focus their attention. It may be said that the G. instinct is more prevalent among the hot-blooded and Oriental races. If that were not so, it would be difficult to explain the absence of restrictions on such games as *roulette* and *trente-et-quarante* in France, Monaco, and, formerly, in Portuguese colonies, and other countries inhabited mostly by Latin races, and in China. For a time, it is true, Ostend was a serious rival to Monte Carlo, but in 1902 the Belgian parliament suppressed public gaming, and awarded compensation

to the gaming-house proprietors of Ostend. *Baccarat* is still prevalent in France, although strictly regulated by the clubs who play the game. The Chinese are a race of notorious gamblers, and, with them, there is curiously intermingled a strong vein of superstition. The Chinese, as a race, certainly do not regard G. as a serious offence as do the more orderly elements of most European nations.

At the present day, however, it must be conceded that even among Latin races G. is less and less favoured by the various states, and that this disfavour has resulted in the glorious isolation of Monaco as the one spot in Europe where the roulette whirls, not only by the sanction of the state, but for the express purpose of providing the revenue to support it, and such epithets as 'a hot-bed of vice,' 'the plague spot of Europe,' 'the pickpockets' paradise,' 'the wastrels' Eldorado,' and so forth, have been showered on this garishly-romantic place. (See MONTE CARLO; ROULETTE). See also GAMING and under the various games, CHEMIN DE FER; TRENTÉ-ET-QUARANTE, etc.

Gamboge, a resinous gum which is procured from certain trees in Siam, Ceylon, and other tropical places. It is used medicinally as a purgative, but cannot be used alone. It is also used for obtaining a yellow pigment.

Gambrinus, a mythical Flemish king who is supposed to have commenced the brewing of beer. The exact derivation of his name is not known, but it is held to be derived from Gan Primus, who was the president of the Guild of Brewers.

Game Laws. The laws relating to the preservation of game and the punishment of persons unlawfully killing game have sunk to a position of comparative insignificance as compared with the state of things a century ago. Blackstone in his time could truly write of the offence of destroying game, that the sportsmen of England seemed to think it of the highest importance, and the only one of general and national concern. The statutes anent the subject were many and various, and, as the classical commentator said, not even grammatical. Moreover, they exhibited the worst features of class legislation, for they drew broad distinctions between offenders of such rank as was called a 'qualification' (i.e. being the son and heir-apparent of an esquire) and indigent offenders. Traditions, however, die hard, and the G. L. were a legacy of the repressive forest laws of the Conqueror. For centuries the one passion of the English landed gentry seems to have been the pursuit of game, and no punish-

ment was too terrible for the poverty-stricken wretch who poached to supply his needs. Even as late as 1827 an Act was passed punishing the felony of killing or wounding deer in any enclosed land with transportation for seven years. But the effect of protecting game by oppressive laws was probably more injurious to the morals of the rural population than any other single cause. The game swarmed before the labourer returning home from a day of unremunerative toil. Repression only led to night poaching with violent resistance to escape detection. The gaols were not large enough to contain the hundreds of prisoners annually convicted. The total public expenditure which the preservation of game occasioned was probably more onerous than that which was required for the support of pauperism. The G. L. were indeed also the greatest hindrances to the improvement of agriculture; and it has often been stated that from three to five hares eat and destroy as much as would keep one sheep. The destruction by game to crops was enormous. But public opinion has effected a great change, notwithstanding the curious anomaly that the Game Act of 1831 and most of the other repressive G. L. still remain on the Statute Book. Poaching is not now looked upon as much more than an escapade, and, comparatively speaking, is but lightly punished. In a word, it may be said that the milder manners of the present age, the growing humaneness towards dumb animals, and the tendency to excuse offenders where no great moral iniquity characterises the offence have conspired to reduce the G. L. to a purely secondary place in the criminal system. The principal Acts now in force are the Game Act, 1831; the Night Poaching Act of 1829 as amended by 7 and 8 Vict. c. 29; the Hares Killing Act, 1848; the Game Licences Act, 1860; and the Ground Game Act, 1880; besides certain Acts for the Protection of Wild Birds. Broadly speaking, these Acts have for their object the restriction of the right either to kill or sell game, and, as incidental thereto, the punishment of those who infringe that exclusive right; the provision of close seasons for birds; and the regulation of game certificates and licences. It may be noted here that these Acts, by punishing trespass as a criminal offence, and inflicting penalties on those who infringe exclusive rights of killing game, have overcome the difficulty presented by the common law principle that there could be no private ownership in animals *feræ naturæ* (i.e. in a state of nature) unless reclaimed or confined, or killed on one's land.

Game is declared by the Game Act of 1831 to include hares, pheasants, partridges, grouse, heath or moor game, black game, and bustards. Snipe, quail, landrail, woodcock, and conies are not game, but they may only be taken or killed by certificated persons. Woodcock and snipe may be taken with nets or snares, and also rabbits, by the proprietor in an enclosed ground or by a tenant and his servant. The right to the game is vested in the tenant in all cases where it is not reserved to the landlord in his agreement with the tenant. Where the game is reserved, the occupier can neither kill game nor give permission to another to do so. He is liable, for what is really nothing but a breach of contract, to a penalty of 20s. with costs for every head of game killed by him or other persons authorised by him. The landlord who reserves the game may kill it on the tenant's land, or authorise any licensed person to enter on the land and kill the game. But the tenant may, in the absence of express agreement to the contrary, kill woodcock, snipe, quail, landrail, or rabbits on the land he occupies, although he may not authorise others to do so.

Poaching or trespassing on the lands of another in search of game is, if committed in the daytime, an offence punishable summarily under section 30 of the Game Act, 1831, by a fine not exceeding £2. Trespassers may be required to quit the land, and give their names and places of abode, and in case of refusal, may be arrested. Firing at game from a highway is a trespass in pursuit of game. The leave of the occupier of the land is no defence where the game belongs to the landlord or some other person, unless given prior to the trespass. These provisions do not apply to persons hunting, or coursing, or exercising a right of free warren, nor to gamekeepers. An information for trespass may be laid by a common informer. Trespassers to the number of five or more acting together are liable to a penalty not exceeding £5. The law is more severe against poaching by night. Night time is to be deemed to begin one hour before sunset and to expire one hour after sunrise. Under the Night Poaching Act, 1829, as extended by an Act passed in 1844, any person unlawfully (i.e. having no certificate or licence) taking or destroying any game or rabbits by night, in any land open or enclosed, or on public roads or highways, gates, paths, outlets, or openings between such lands and roads or paths, or leading to enclosed gates; or any person either entering or being by night in such places, with

any gun, net, engine, or other instrument, for the purpose of taking or destroying game, may be summarily punished for the first offence with imprisonment not exceeding three months, and at the expiration of such period be bound over for a year; for the second offence, the above periods are doubled; and for the third or subsequent offence, penal servitude may be awarded to the extent of seven years. Persons found committing such offence may be arrested by the owner or occupier of the land, or anyone having the right of free warren or chase there, or the lord of the manor, or the gamekeeper, or other servant of such persons; and any violence or offer of violence with an offensive weapon may be visited with penal servitude up to seven years. Under the same Act as similarly extended to public highways and gates by the Act of 1844, if three or more persons by night unlawfully enter, or are on any land for the purpose of taking or destroying game or rabbits, any of the party being armed with firearms or other offensive weapons, they shall be guilty of a misdemeanour punishable by penal servitude to the extent of fourteen years. If one of the trespassers is armed to the knowledge of the rest, all may be convicted. Large stones and sticks are 'offensive weapons' if the jury think they were meant to be and were capable of being used as such. No prosecution can be begun under the Act of 1829 for a summary offence after six months; but, where the offence is indictable, a prosecution is not barred till the expiry of twelve months from the alleged commission of the offence. The Poaching Prevention Act of 1861 gives power to a constable to search persons in public places whom they have good cause to suspect of coming from any land where they have been unlawfully engaged in pursuit of game; they may also search any cart or conveyance of the suspects, and seize game, guns, nets, and engines. If subsequently convicted, such searched persons may be fined a sum not exceeding £5, in addition to which they forfeit the goods seized. By an Act passed in 1862, unlawfully taking or killing hares or rabbits in warren by night is punishable as for a misdemeanour; the punishment for the same offence committed in the daytime is a fine of £5. Unlawfully coursing, hunting, or killing deer in an unenclosed part of a forest is punishable by a penalty not exceeding £50 for a first offence, and, for a second offence, imprisonment not exceeding two years, which latter punishment also applies to a first

offence where the deer were on any enclosed land. Strong measures to prevent trespassing or poaching may doubtless be adopted, but setting spring-guns, man-traps, or other engines calculated to destroy life renders the person so doing liable to penal servitude to the extent of five years.

A licence is required by every person who hunts or takes G., except persons (in Great Britain) taking woodcock or snipe with nets or springs; proprietors or tenants on enclosed land killing rabbits; persons hunting deer or hares with hounds; and others. Occupiers of enclosed land, or owners, having the right to kill G., may themselves kill hares, or authorise others to do so, without a licence, but such authority must be limited to one person at a time in any one parish, and must be registered with the clerk of the Petty Sessions' justices. A 'gun' licence is required even when the quarry is not legally 'game'; but a game licence covers a gun licence. The charge for a licence taken out after July 31, to expire on the next July 31, is £3; to expire on Oct. 31 next ensuing, £2; for a licence taken out after Nov. 1, to expire July 31, £2; and for any continuous period of fourteen days, £1. (*See also CLOSE TIMES.*)

In the U.S.A. the G. L. include deer, elk, antelope, moose, caribou, squirrel, rabbit, quail, grouse, and prairie chickens, wild turkey, pheasant, woodcock, duck, goose, brant, plover, snipe and rail. The close seasons naturally vary in the different States, and often in the different districts of the States. It is necessary in most cases to consult local laws.

Game Reserve is the term applied throughout the British Empire to large tracts of country which have been set aside or reserved by the var. govts. in order that the wild life of the particular territory may be protected against extinction, likely to be brought about by the predatory instinct of man and the spread of civilisation. In the old days the term was applied to reserves in England which were delimited in the first place for the king so that within these reserves game should be encouraged and preserved in order to provide pleasure for the royal hunt. In recent times, however, the original purpose of the game reserve has been reversed and the modern game reserve has been set out not as a measure against 'indiscriminate' killing of the game, but as a means of preserving the wild life of the locality against total extinction. Large tracts have been

set aside in North America, Australia, Africa and Malay. In Canada the Dominion Gov. maintains 11 parks, which are administered by the National Parks branch of the Department of the Interior. In these parks the hunting of game is forbidden, and the wild life resources preserved. The table on p. 350, which has been published by the Canadian Gov., shows how careful the Dominion Authorities have been in the following out of the idea of game reserves. There are also other parks not included in the game reserves, of which the most important are the Algonquin Park in Ontario, and the Laurentides Park in Quebec.

In the U.S.A. the movement of game reserves (or game preserves as it is here known) has been actively pursued, and large tracts of territory embracing several thousands of sq. miles have been set aside for the preservation of wild animal and bird life. The Yellowstone Park is the most important wild animal and bird sanctuary in the U.S.A.

Gaming. A wager or G. transaction involves a promise to pay money or something of value solely upon the determination of an uncertain event. The policy of the English law is to render practically all such agreements unenforceable, the only substantial exceptions being the various commercial transactions relating to insurance and the purchase of shares on the Stock Exchange. The Gaming Act of 1845 makes all G. or wagering contracts null and void. By the Gaming Act of 1892 no one can recover under a contract in any form commission or reward promised him for making or paying bets on behalf of another. The effect of this Act is that if A employs B, a betting commissioner or turf agent, to make bets for him and loses, B cannot recover from A money paid to discharge such bets; again, if A obliges his friend B by paying his racing debts, he cannot recover the money from B; and again, if A lends B money, knowing that B is going to make bets with it, he cannot recover from B the money so lent. But if A makes bets for B and *receives the winnings* he can be compelled to pay them over to B; and, again, if A deposits money with B, a stakeholder, he can recover it from B at any time before B has actually paid it away on the determination of the wager. Securities such as promissory notes or bills of exchange given in payment of a bet are void as between the original parties to it, and a subsequent holder even for value cannot enforce such an instrument if it be shown that he knew of the illegal consideration for which it

was originally given. Speculating on differences in the Stock Exchange falls under the Act of 1845 where it can be shown that the contract was a 'time bargain,' or mere gambling transaction (see DIFFERENCES). Contracts of marine insurance are perfectly valid where the person effecting the insurance had an *insurable*

GAMBLING; and for the prohibition of lotteries, see GAMBLING, and LOTTERIES. See Anson, *Principles of the Law of Contract*; Stutfield, *The Law relating to Betting, Time Bargains and Gaming*.

Gamma Rays (γ rays). Radio-active substances emit three kinds of 'rays' named α , β and γ rays.

CANADIAN NATIONAL PARKS AND RESERVES.

Parks.	Location.	Date of Establishment.	Area in Sq. Miles.
Rocky Mountains Park	Alberta, East slope of Rockies	1885	3,835
Yoho Park	British Columbia, West slope of Rockies	1886	476
Glacier Park	British Columbia	1886	468
Revelstoke Park		1914	100
Kootenay Park		1920	587
Jasper Park	Northern Alberta	1907	4,521
Waterton Lakes Park	Southern Alberta, adjoining U.S. Glacier Park	1895	220
St. Lawrence Islands	Ontario (Provincial)	1904	(140 acres)
Broder Park	Ontario (Provincial)	1919	(20 acres)
Pt. Pelee Park	Ontario on Lake Erie	1918	4
Vidal's Point	Saskatchewan	1921	(17 acres)
Little Manitou Lake Reserve	Saskatchewan (Provincial)	*	Vacant lands around lakes
Prince Albert Park	Saskatchewan	1927	1,869
Tar Sand Reserve	Alberta (Provincial)	*	2
Animal Parks and Reserves (all Provincial)			
Buffalo Park	Near Wainwright, Alberta	1908	197.5
Elk Island Park	Near Lamont, Alberta	1911	51
Nemiskam (Antelope)	Alberta	1922	9
Wawaskesy (Antelope)	Alberta	1922	54
Menissawok (Antelope)	Saskatchewan	1922	17
Wood Buffalo Park	Alberta and N.W.T.	1922	17,300
Historic Parks (partly Dominion and partly Provincial)			
Fort Howe	Saint John, New Brunswick	1914	(19 acres)
Fort Anne	Annapolis Royal, Nova Scotia	1917	(31 acres)
Fort Beauséjour	New Brunswick	1926	(59 acres)
Other Parks (not Game Reserves)			
Algonquin Park	Ontario	—	2,741
Laurentides Park	Quebec	—	3,565

* Reserved by order of the Minister.

interest in the subject matter of the policy at the date of the loss; the result of this is that a cargo owner may recover on a policy entered into many days after his cargo has been lost at sea provided he was ignorant of such loss at the time he made the contract. See under INSURANCE. For the Acts forbidding certain games as criminal offences, see under

The first two radiations consist of material particles, but γ rays are electromagnetic radiations identical in character with light, wireless waves and X rays, but of wave-lengths of the order of 10^{-10} cm.; indeed they are the shortest electromagnetic waves known at present. Gamma rays are more penetrating than X rays because of their shorter wave-lengths

and are used to cure deep-seated cancers.

Gamut, the set of notes in a musical scale which number eight, and which form an octave. In old notation the G. refers to the lines or spaces on which the notes are printed.

Gand, see **GHEENT**.

Gandak : (1) Great G., an Indian river which rises in the Himalayas in Nepaul, and is a tributary stream of the Ganges, joining that river at Patna. Its length is about 400 m., and it is known also as the Narayani. (2) Little G., a river which rises in the hills of Nepaul and which joins the Gogra at Sunaria. It is called also the Gunduck.

Gandersheim, an ancient tn. in the duchy of Brunswick, some 50 m. from the town of that name. Its abbey made it famous for some centuries; it was used as a place of education for the daughters of nobles. Pop. 3010.

Gandharvas, one of the bands of semi-divine beings created in the beginning by Brahma. They were 6333 in number, and were born 'imbibing melody.' There are different accounts of their origin. In later myth they are met with as the musicians of Indra's heaven, espoused to the Apsarasas (nymph-like beings). They have been identified with the Centaurs.

Gandhi, Mohandas Karamchand, Indian Nationalist leader, was b. Oct. 2, 1868, at Porbandar, in the Kāthiāwār peninsula, on the coast of the Arabian Sea. His parents were of Bania caste and Jain religion. In boyhood he went through a period of atheism, out of which he came, by the help of such authors as Tolstoy and Edward Carpenter, into an ethical dogmatism that has caused much trouble to himself and his countrymen. At twelve he was married, and his marriage has been happy. In 1888 he arrived in England; he studied at the University College, London, and was called to the Bar at the Inner Temple. He returned to India in 1891, and soon afterwards began practice in the Supreme Court of Bombay. In 1893 business took him to Pretoria. He resolved to stay in S. Africa to support the cause of Asiatic immigrants, and he obtained a lucrative practice in Johannesburg, but gradually came to consider his profession immoral. In 1899 he organised an Indian Red Cross for the Boer War. In 1903 he founded a paper, *Indian Opinion*, at Durban. In 1904 he instituted a hospital in Johannesburg when plague broke out, and he was prime mover in the great demonstration there, Sept. 11, 1906, whereat the oppressive 'Asiatic ordinances' were denounced. During the native revolt in Natal in 1908,

he organised, and served in, a corps of stretcher-bearers. For his political activities he was frequently arrested and imprisoned; even from extremists on his own side he suffered violence. The oppressive ordinances were removed in 1911; G. returned to India, and on outbreak of the Great War came to London to organise an Indian ambulance corps. The attitude of the British Govt. in India after the War entirely alienated him. He was the *religious* leader of the national movement till Tilak's death in 1920; he then became political leader by necessity. He proclaimed the *Hartal*, or cessation of work, of April 6, 1919, which was the precursor of the affair of AMRITSAR (q.v.). He took advantage of Moslem unrest provoked by the Allies' treatment of Turkey; and their Khilafat Committee, May 28, 1920, endorsed his non-co-operation policy, which took effect in August. It was, like Sinn Fein in Ireland, an ignoring of the British Govt.—although it did not yet involve withholding taxes. The All-India Congress at Calcutta in Sept. approved the policy, which included the fostering of home-industries, such as the use of the spinning-wheel.

In Nov. 1920 G. founded the National University of Gujarat at Ahmedabad. The non-co-operation policy, of course, did not pursue the quiet course indicated by G.'s ethics. Strikes and riots were widespread in 1921. In Aug., G. superintended the burning of foreign merchandise in Bombay. 'Civil disobedience,' the next step, involved non-payment of taxes—it began in Nov., when the Prince of Wales arrived. There was rioting and looting, so G. suspended the disobedience order. At the end of the year, Congress invested him with dictatorship. More violence by Nationalists (at Gorakpur) caused G. to abandon 'civil disobedience'; but he was arrested and tried at Ahmedabad in March 1922, and sentenced to six years' imprisonment for preaching disaffection. After an operation for appendicitis in prison, he was released in Jan. 1924, but for a while suffered eclipse. Near the end of 1927 his fame revived—he was enthusiastically received in Ceylon. After a visit to Burma, he was in Aug. elected to presidency of Congress; but he declined it, leaving it to his Lieutenant, Nehru (d. Feb. 1931). In March and April, 1930, he made his celebrated march from Ahmedabad to the sea, and formally infringed the salt-law. He was arrested May 5, and sentenced to be kept in Yeravda Jail, near Poona, during the

Gov.'s pleasure. Released Jan. 26, 1931. *See also* under INDIA.—*History.*

Gandia, a Spanish seaport in the prov. of Valencia, nearly 40 m. S.S.E. of the town of that name. The chief exports are oranges, raisins, wine, onions, and tomatoes. Pop. 12,639.

Gando, or **Gandu**, a native state in N. Nigeria (British Protectorate). The natives belong to the Fulah race. The chief town is Gandu. The total area is about 80,000 sq. m.

Ganesha, or **Gana-pati** (*i.e.* Lord of Hosts), the name of a Hindu God. the son of Siva. His images represent him as a stout man with an elephant's head and four arms.

Ganges, a great river of Northern India. This great stream is formed by the draining of the southern slopes of the Himalaya Mts. It rises in the Garhwal state and issues from an ice

the Gunti, Gandak, and Gogra. The river passes through the great city of Benares and then approaches the Bay of Bengal; 220 m. before reaching the shores of the bay it begins to spread out and form the delta. The main channel, which is called the Padma or Padda, flows in a southeasterly direction, and is met at Goalanda by the main stream of the Brahmaputra, and these two streams form a great estuary which is known by the name of the Neghka, and which enters the bay of Bengal at Moanhali. This great channel is the most easterly of all the channels of the delta. On the other side we find the Hugli, which is the most westerly of all the channels. The land which goes to form the delta is in the N. fertile and rich, but in the S. is swampy and goes by the name of the Sundarbans.



[Gandian Pacific

BATHING GHATS ALONG THE GANGES AT BENARES

cave of the Himalayas, near Ganguotri, 10,000 ft. above the level of the sea. The river when it first issues forth is called the Bhagirathi. It is not until it is united with the Jahsari and the Alaknanda, that the united stream is known as the G. The G., besides being the great river of India, is also an essential part of the Indian religious system. Both the source and the junction of the rivers are regarded as sacred spots by the Hindus. Emerging from the Himalaya Mts. it turns to the S.W. It can hardly, however, be regarded as a great river until at Allahabad it receives the Jumna, a stream which has its origin to the W. of the G. The junction of the Jumna and the G. is regarded by all Hindus as the holiest and most sacred of places, and is the scene of constant pilgrimages by the Hindus, who come there to wash away their sins. Other tributaries of the G. are

The great commercial stream of the delta is the Hugli, on which stands the town of Calcutta. The town of Calcutta stands about 90 m. from the sea-coast. Formerly steamer communication existed as far as the town of Allahabad, but nowadays, owing to present-day facilities for traffic by rail and the increasing shoals in the river, steamers go no further than Calcutta. Often great changes take place in the river-bed: islands are thrown up, new channels are sought. Such changes are so rapid that it is dangerous for any large or permanent structure to be erected on its banks.

The G. is already crossed by six railway bridges as far as Benares and another in Eastern Bengal is about to be erected. There are two canals—the upper Ganges Canal and the Lower Ganges Canal—which together with the Jumna irrigate the greater portion of the land between the Ganges

and the Jumna above Allahabad. There is no important navigation on them. The river is essentially a river of great towns, and has such cities as Patna, Benares, Allahabad on its banks, in addition to Calcutta.

Ganglion (Gk. γαγγλιον, a swelling or excrescence): 1. In anatomy, an enlargement occurring in the course of a nerve, and containing bi-polar or multi-polar nerve cells in addition to nerve filaments. Two systems of nerves have ganglia upon them. First those of common sensation, whose ganglia are near to the origin of the nerve in the spinal cord. Secondly, the great sympathetic nerve which has various ganglia on various parts of it. In the invertebrates these ganglia are centres of nervous force and are distributed through the body in pairs. The cerebral ganglia of vertebrates are the brain itself, the masses of grey matter at the base of the brain, as the optic thalamus, etc. 2. In surgery, an encysted tumour, situated somewhere on a tendon. 3. In botany, the mycelium of certain fungi. Lymphatic ganglion—a lymphatic gland.

Gangotri, a Hindu temple and place of pilgrimage in the Himalayas, on the r. b. of the Ganges. It dates from the eighteenth century, and the pilgrims to this temple are supposed to be relieved of their sins.

Gangpur, a native state in Bengal, India. Area 2484 sq. m. Pop. about 300,000.

Gangrene (Gk. γάγγραινα), or **Mortification**. G. is the condition in which putrefaction accompanies the death and degeneration of body tissues or of some of their constituent cells and arises from an interference with the blood supply. The part affected may be either dry, that is mummified, or moist, the amount of moisture depending upon the degree in which the blood supply is cut off. The cause of G. may be local, constitutional, or the two combined. It may be the result of changes in the vessel wall, as in senile G. of the old and feeble, and in certain diseases, such as diabetes, typhoid, measles, etc. Blocking of the vessels is another cause, for example in the lungs or other parts, from pressure or changes outside the vessel. Heat or cold (burns or frost bite), chemical agencies and bacillary affections, such as carbuncles, erysipelas, etc., may all bring G. in their train. Since the use of antiseptics has become general, traumatic and hospital gangrene are comparatively rare. During the Great War, conditions were frequently such that it was impossible to pay immediate and constant attention to wounds, and gangrene not infre-

quently supervened. Antisera effective against germs causing gangrene and other dangerous diseases are now injected, and the wounds, cleansed with antiseptics, are kept open until they are completely drained and show no sign of discharge or inflammation. Dead and injured tissues are removed, and the wound is reopened if any inflammation appears. If the disease shows any indication of spreading, amputation well above the limit reached by the G. is the only means of preserving life. The pain and extent of the G. depend upon the cause and its persistence. When the cause is removed, the gangrenous dead part dries up and separates. *Treatment*.—During the separation, the affected parts should be kept aseptic, surgically clean, and free from germs. The patient's strength should also be kept up by good nourishing food. In G. of a limb, amputation is indicated when there is no prospect of a return of healthy blood to supply the part affected.

Gangs, Agricultural. The Agricultural Gangs Act, 1867, regulates the employment by gang-masters of women, young persons, and children in agricultural labour. A gang-master means any person who employs such labour upon land not in his own occupation, and an A. G. means a body consisting of such persons as above-mentioned or any of them under the control of a gang-master. The combined effect of the Agricultural Gang Act and the Elementary Education Acts (*see also* FACTORY LEGISLATION) is to make it unlawful to employ a child under twelve in an A. G. No female of thirteen years or upwards may be employed in the same gang with males, or under a male gang-master unless a licensed female gang-master be also present. No person may act as a gang-master without first obtaining a licence from the town or district council for the district in which he proposes to act as gang-master; and persons of bad character and licensees to sell intoxicating liquors are ineligible for a gang-master's licence. An applicant has the right to appeal to Quarter Sessions from a refusal to grant a licence. A penalty not exceeding twenty shillings may be inflicted on a gang-master for every person employed contrary to the Act. The occupier of the land is liable to a similar penalty unless he proves that the contravention of the Act was without his knowledge. A similar penalty may be imposed on a gang-master for every day that he acts as such without a licence.

Ganjam, a district of India, in the

N. of Madras Presidency. It has an area of 8380 sq. m., and is, for administrative purposes, divided into five sub-divisions. The Bay of Bengal bounds the dist. on the S.E.; the low-lying plain that lies along the coast produces rice, millet and grain. To the W. lie the E. Ghats, the jungles on the slopes of which are inhabited by very backward, indigenous tribes. Tanning and weaving are the chief industries, and Berhampur is the capital, superseding Ganjam. This old town, once an important centre of trade, is now of little importance, having been abandoned after an epidemic in 1815. It stands near the mouth of a small river, 90 m. S.W. of Calcutta. Pop. (dist.) 1,520,000.

Gannet, or *Sula bassana*, a web-footed, aquatic bird, a species of Sulidae or Steganopodidae. It is popularly called the Solan goose, and derives its specific name from the



GANNET
(*Sula bassana*)

Bass Rock, one of its favourite haunts. It is solely an oceanic bird, with an easy and powerful flight; its entire length is about 3 ft., and the general colouring is white with a buff tinge on the head and neck; the bill is long and thick and compressed at the point. Gs. are found nesting on several rocky stations on the coast of the British Isles, Ailsa Craig, St. Kilda, Suliskerry, etc., but in late autumn they migrate to N. Africa. They feed on such fish as swim near the surface, herrings, pilchards, etc., diving swiftly, and sometimes from a considerable height, upon their prey.

Ganoidei (Gk. γάνος, brightness), the name given to one of the great orders into which fishes are divided; most of the fossil fish of palæozoic and mesozoic ages belong to this group, whose members are generally distinguished by the skeleton being cartilaginous and the skin furnished with hard, bright scales. Fossil

G. include *Holoptychius*, of the Upper Devonian, *Palænisus*, of the Permian, and *Cephalospis*, of the Upper Silurian and Lower Old Red Sandstone strata. The living genera of G. are chiefly fresh-water fishes and include *Acipenser*, the sturgeon, *Amia*, the bow-fin, *Lepidosteus*, the gar-pike, and *Polypterus*, found only in tropical Africa. It is now customary for systematists to unite the G. and Teleostei under the heading Teleostomi, and the term ganoid is falling into disuse.

Ganymedes, son of Tros, King of Dardania, was a Phrygian youth of surpassing beauty, who was borne up to heaven to serve as Zeus' cupbearer. Classical poetry is full of allusions to his fate, whilst Leochares, a fourth-century Athenian sculptor, made a fine bronze group representing the eagle with outspread wings in the act of carrying the boy to the home of the gods. Later Gk. mythology represents him as the genius of the life-giving Nile, and ancient astronomers said he was Aquarius.

Gao, or Gogo, tn. of Fr. W. Africa, in the prov. of Upper Senegal and Niger. It stands on the l. b. of the Niger, about 200 m. E. of Timbuctu direct, and by river nearly twice that distance. It was once a prosperous tn., the capital of the empire of the Songhais, and the ruins of the tomb of a Songhai leader, Mohamed Askia, are still to be seen. Of this ancient native tn. nothing but ruins now remain. The Fr. established a military post here in 1900, and the new tn. that has since sprung up has a pop. of about 5000. Mungo Park, Barth and Hourst visited Gao in the course of their explorations.

Gaol, see PRISONS.

Gaol Delivery. One of the commissions under which the judges of assize derive their authority (see ASSIZE). The Commission of G. D. is a patent in the nature of a letter from the king, directed to the judges of assize of each circuit (see CIRCUIT), king's counsel attending the circuit, clerk of assize, and associate, authorising them to 'deliver his gaol at a particular town of the prisoners in it,' i.e. to try every prisoner in the gaol committed for trial on any charge whatever. As, under this commission, judges may proceed upon any indictment of felony found before other justices and not determined, their authority differs from that of justices of oyer and terminer (q.v.), who can only proceed on indictments found at the same assizes. The Court of King's Bench (q.v.), on account of its status as the highest court of criminal jurisdiction, automatically determines and absorbs by its coming

into any county all former commissions of G. D. and over and terminer. This, however, does not apply to the Central Criminal Court. See Harris, *Principles of Criminal Law*; Russell on *Crimes*.

Gaon (pl. Geonim), properly signifies pride or majesty, and the word may be a translation of the Latin word 'clarissimus,' which was sometimes a title applied to the Rom. emperors. In the history of Judaism G. was a title given especially to the heads of the Jewish Academies of Sura and Pumbedita in Babylon. Sura was the senior Academy, and the G. of Sura was recognised by the Babylonian Court as the civil head of the Jews. During the Babylonian Gaonate there were thirty-nine Geonim of Sura, beginning with Mar R. Mar in A.D. 609, and ending with R. Samuel ha-Kohen in 1034, and forty-nine Geonim of Pumbedita from Mar b. R. Hanan in 589 to R. Hai in 1038. The age of the Gaonate was marked by an excellence in literary studies and an increase of culture, especially during the rule of R. Saadia, G. of Sura in 928. Studies were not confined to the Talmud, but one of the principal works of the Geonim was in replying to questions of ritual, submitted to them by Jewish congregations in distant communities. A century after the death of R. Hai, the last Babylonian G., the title was assumed by the Head of the Jewish Academy in Palestine. This Academy probably ceased to exist before the capture of Palestine by the Christians, but Mazliah retained his title of G. while at the Fostat Academy. The traditions of the Gaonate survived in Damascus, where in 1200 the teachers there were spoken of as 'the scholastic heads of Israel.'

Gap (the ancient *Vapinicum*), the cap. of the dept. of Hautes-Alpes, France. It is built on the r. b. of the Luye, 2418 ft. above the sea, and is connected by rail with Grenoble (48 m. to the S.S.E.). It possesses a fine new cathedral. Pop. 7000.

Gap Canal, or **Canal du Drac**, a means of communication between the Durance and the Drac Rivers, and an enormous aid to irrigation. It was dug in 1864-88, and is 445 m. long. With its arms, the Rochette and the Charance, and other subsidiary branches it affects an area of 18,600 acres.

Garashanin, Iliya (1812-74), Serbian statesman, b. Jan. 28 at Garasha; son of a rich peasant. Educated at Semlin, Hungary. In 1836 appointed by Prince Milosh colonel in new regular army of Serbia. Exiled 1839 for plotting

against Obrenovich dynasty; returned 1842, entered office of Ministry of Interior, helped to restore Kara-georgevich family. In 1844 became Minister of Interior. Premier 1852-54. Dismissed, because of anti-Russian proclivities, at instance of Menshikov; but managed to keep Serbia neutral in Crimean War. Minister of Interior again 1857-58; and, at his instance, the Serbian National Assembly, after an interval of ten years, was convoked on St. Andrew's Day, 1858. It, however, restored the Obrenovich dynasty. Prince Michael, who succeeded Milosh in 1860, gave premiership to G., who obtained great concessions from the suzerain power. He began to prepare a general Balkan rising; but resigned suddenly, late in 1867. Died on or about June 22.

Garat, Dominique Joseph (1749-1833). Fr. publicist, b. near Bayonne. In 1790 was a member of the Constituent Assembly, whose debates he reported in the *Journal de Paris*. First won literary distinction by his *éloges* on Fontenelle and other famous Fr. writers, taking several prizes awarded by the Fr. Academy. A revolutionary at heart, he became Minister of Justice during the early days of the Fr. revolution and in that capacity apprised Louis XVI. that the Convention had condemned him to the guillotine, but at the same time expressed his abhorrence of the decision. Under Napoleon he was ennobled and also became a senator and President of the Institute; but lost office on the restoration in 1815. Consult Thiers, *History of the French Revolution*; and the *Nouvelle Biographie Générale*.

Garat, Pierre-Jean (1764-1823), a singer, was saved from the penniless position in which his father had put him, because he would not be a lawyer, by the generous help of a friend, who gained him a secretaryship under Comte d'Artois. Professor in singing to the Fr. queen, he later suffered imprisonment for an original song of Royalist sympathies. The fine quality of his voice, combined with a remarkable compass, secured him an unrivalled success in the five countries of Europe which he had occasion to visit.

Garay, Janos (1812-53), a Hungarian poet, had throughout his life a struggle for a bare existence, and was obliged to eke out his livelihood with literary hack-work. Yet his numerous historical dramas, ballads, romances, and lyrics are justly treasured to-day by all his book-loving compatriots. His ambitious historical poem, *Saint Ladislaus*, is his last and most celebrated work.

Arbúez and *Ersebet* are two of the historical plays, whilst *Balaton* *Kagylók* (shells from the Balaton Lake) contains some of his finest lyrics.

Garcao, Pedro Antonio Correa (b. 1735 or 1724-72), a Portuguese poet, lived a sequestered life near Lisbon till, in his thirty-sixth year, he was thrown into prison, perhaps because some of his writings had offended the autocratic gov. There he died. In most of his dramas, sonnets, odes, satires, and epistles, he was avowedly imitating classical models, and in the last two he has assuredly proved himself 'the Portuguese Horace,' a title given also to Ferreira. The purity of his taste and style undoubtedly lifted the national literature out of the mire of decadence into which it had fallen, but G. must be described as a writer of conscientious refinement rather than as a genius.

García I., a Span. king, reigned over Navarre from 885 to 905. His reign was darkened by continual warfare against the Moors.

García II., the Trembler ('El Tembloso'), ruled Navarre from 924 to 970. His surname was due to a physical infirmity, and in the active part he took in the struggles between Leon and Castile he proved a worthy successor to the warlike Sancho.

García III., king of Navarre from 1035 to 1054. He was the eldest son of Sancho II. the Great. Defeated and killed in the battle of Atapuerca, his kingdom passing to Ferdinand's nephew, Sancho IV.

García IV., a ruler of Navarre from 1134 to 1150. When Alphonso, the Battler or the Emperor, foolishly bequeathed Navarre to the Knights of St. John, and Aragon to the Templars, the Navarrese, refusing a foreign yoke, chose García Ramirez, a scion of the oldroyal stock, to be their king.

García, Manuel del Popolo (1775-1832), a vocalist and composer, was famous among his contemporaries for his splendid and artistic singing, but posterity will remember him as the author of *The Caliph of Bagdad*, an opera performed with remarkable success at Naples in 1812. At first a chorister in the cathedral of Seville, he appeared successively in his own and other musicians' operas in Cadiz, Madrid, Paris, and London. After a profitable tour in America (1825), he was unfortunately robbed of all his wealth whilst on his way to Vera Cruz. For the remainder of his life he taught his art in Paris, using the excellent system advocated in his *Metodi di Canto*.

Garcilaso (c. 1535-1616), 'the Inca,' as he called himself, was a Span.

historian, son of Garcilaso de la Vega and a princess of the royal line of Incas. Born at Cuzco in Peru, he early (c. 1560) migrated to Spain and passed most of his life at Cordova, where a chapel in the cathedral bears his name. Considering his intimate knowledge of the native language, his Peruvian history, entitled *Comentarios Reales que tratan del Origen de los Incas reyes, que fueron del Peru* (1609-17), is disappointing.

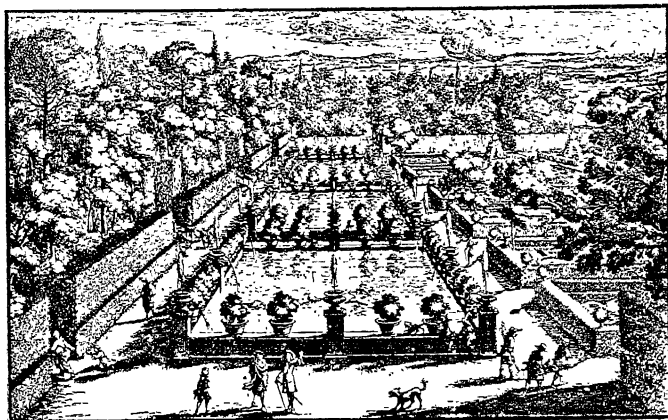
Garcilaso de la Vega (c. 1503-36), a Span. poet, became at the age of seventeen 'continó' or guardsman of Charles V., displayed signal courage at the battle of Pavia (1525), fought in 1529 against the Turks, who were trying to reach Vienna, was present at Bologna in 1530 at the magnificent coronation of the emperor, and in 1532-34 served Don Pedro de Toledo, the viceroy of Naples. Wounded during the Tunis expedition of 1535, he met his death the following year, whilst storming a small fort in Mury during the retreat from Marseilles. He is the finest pastoral poet of Spain, and with Boscan, his friend, shares the honour of having popularised the It. hendecasyllabic verse. His finest poem is the first of his three eclogues, penned in Naples under the inspiration of Virgil's tomb. A few odes and sonnets are included in his scanty remains, scanty, no doubt, because of his short life. But they are fine enough to enrol him among the classics, and, as Ticknor says, 'Garcilaso de la Vega has come down to us enjoying a general national admiration such as is given to hardly any other Span. poet, and to none before his time.' He was the author of that great sonnet which begins 'O dulces prendas por mi mal halladas.'

Gard, a southern dept. of France, corresponding to the old prov. of Languedoc, and confined on the N. by Lozère and Ardèche, on the E. by the Rhone (its chief river), on the S. by the Mediterranean, on the S.W. by Hérault, and on the W. by Aveyron. The Cèze, the Ardèche, and the Gard are all affluents of the Rhone. Ridges of the Cevennes, which in l'Aigoual attain an altitude of 5120 ft., cover the north-western portion, whilst at the S. low marshy plains, which yield quantities of salt, stretch away to the sea. The Garrigues comprise the rest of the department, being a hilly, dry limestone district, tormented with the biting N.W. wind known as the 'mistral.' G. yields splendid crops of wheat, oats, and rye, abounds in mulberries, olives, and vines, is known for the excellence of its cattle, and has a plentiful store of mineral wealth, including coal, iron, lignite, copper, zinc, and lead.

Alais, the centre of the silk industry; Bessèges; Nîmes, the capital; and La Grand' Combe, are important towns in the mining district, other cities of note being Aigues-Mortes, Uzès, Beaucaire, Saint-Gilles, and Le Vigan. The total area is 2270 sq. m. Pop. 402,000.

Garda, Lake of (ancient *Lacus Benacus*), the largest of the Lombard lakes, lies partly in the prov. of Verona, and partly in that of Brescia, in Italy; except Riva, the most important city on the lake shores, which lies at the northern head, and is in Tirol. At this extremity the Sarca feeds the lake from the glaciers of the

trees for their sustenance. Little art was used in their formation, but planting in regular rows was recognised as a useful measure in order that the plants should receive the attention they required. Ancient tablets from Egypt show orderly rows of sycamore, fig-trees, and date-palms under cultivation for their enjoyable shade, profitable fruits and wood. That flowers were grown for pleasure is indicated by a representation in a Theban tomb of early date of beds of cornflowers, poppies, and papyrus growing by the side of a canal. Parks of trees with cared-for paths and bushy



THE WATER BASINS IN THE VILLA D'ESTE, TIVOLI

Adamello, whilst the Mincio flows out at the southern end to join the Po. Here, too, the beautiful and luxuriant promontory of Sermione, the 'Sirmio' of Catullus, juts outward into the lake, separating the towns of Peschiera and Desenzano, which lie $8\frac{1}{2}$ m. apart. On its eastern fringe Garda is overlooked by the precipitous grey cliffs of Monte Baldo, but opposite, on the western shore, between Garguano and Salò, stretches a fertile region, where olives, lemons, and mulberries abound. Garda lies 215 ft. above sea-level, has an area of 142 sq. m., a length of 33 m. and, a breadth varying from 2 to 10 m.

Garden Art. The first gardens were made when the early nomadic tribes settled down on an approved spot, surrounded themselves and their herds with a hedge as a protection against wild beasts, and within their enclosure planted vegetables and fruit

undergrowth were instituted by the Babylonians, who also invented about the ninth century the 'hanging gardens of Semiramis'—one of the wonders of the world—a series of terraced gardens supported by strong arches. The acclimatisation of foreign trees in his own land began with Tiglath-Pileser I, c. 1100 B.C. The early gardens of Greece were strictly utilitarian, consisting of vegetable beds, and our modern pot-gardening began when the votaries of Adonis sowed in earthen pots fennel, lettuce, wheat and barley—plants which sprang up soon and as quickly withered, thus symbolising the early violent death of the beautiful youth. The gymnasiums of early times were finely ornamented with park grounds, and were later constructed with the addition of baths. Both in Greece and in Italy fountains, water-works and statuary have always played a

leading part in the formation of a garden; and in Spain and France these are also important. The wonderful water devices in the ruined garden of the Villa d'Este at Tivoli still reflect in some measure the marvels of the Renaissance. In England during the early part of the Christian era useful plants constituted the gardens, while the rose and lily were regarded as being heathenish plants; later they became the symbol of Mary and the reward of martyrdom. During the Middle Ages ladies of the household used to attend to the gardens, having learned from the monks the art of growing healing herbs among their vegetables; flowers were planted in the grass, clipped trees, arbours of roses and honeysuckle, turf seats, and outdoor baths added to the later pleasures of gardens, and meals in the open air became popular. Among great garden-artists or architects were Rainaldi, Le Blond (who worked for Peter the Great), Boyceau (French Renaissance garden artist and architect of the Versailles garden), André Le Nôtre (seventeenth-century French garden artist, who worked at Versailles and Vaux-le-Vicomte), Leon Battista Alberti (Ital. Renaissance), Bramante (Ital. Renaissance), Lancelot Brown (English landscape garden artist), Sir Joseph Paxton (who laid out the Chatsworth gardens), and Winckelmann. England has learned much from other countries in the making of gardens—as the Dutch sunk gardens show, or the Oriental influence at work in the pagoda at Kew—but in naturalness she is supreme; the unrivalled lawns with herbaceous borders, or rock borders planted with alpine flowers, are part of her glory. Hampton Court, Kew Gardens, Hyde Park, and Regent's Park all supply beauty and inspiration to dwellers in London; and among exquisite private gardens are those at Sandringham, Chatsworth in Derbyshire, Aldenham House in Herts, The Pleasaunce in Overstrand, Norfolk, Wisley Gardens in Surrey. America has vast national parks and also charming domestic gardens: they are usually enclosed by hedges, vines on lattice screens, or masses of informal plantings; climbing vines on porches and walls are popular; clipped trees and shrubs, and statuary are very little used. For a full, illustrated, scholarly work, consult *A History of Garden Art* by M. L. Gothein, translated by L. Archer-Hind, and edited by Walter P. Wright, 2 vols., 1928.

Garden Cities are indigenous to England; the only two examples are

Letchworth (1903) and Welwyn (1920) both in Hertfordshire. They owe their origin to the enthusiasm of Sir Ebenezer Howard (to whose memory a memorial stands in Welwyn near the railway station), whose ideals were elaborated in his *To-morrow: A Peaceful Path to Real Reform* (1898), subsequently issued as *Garden Cities of To-morrow* (1902). There were, prior to these 'G. Cs.', 'industrial villages' built by manufacturers near industrial centres, of which the most famous are Bournville and Port Sunlight. The threefold character of the garden city—industrial, agricultural, and residential—differentiates it from the 'industrial' or 'garden' village on the one hand and the 'garden' suburb, like Hampstead, on the other, with which latter, indeed, it is often confused. Neither is the garden city mere town planning, although it provides for town planning. It is essentially a self-contained unit launched *de novo*, and not a mere scheme of land development. Sir Ebenezer Howard's idea was to check the migration of population from the country districts to the overcrowded towns by establishing new industrial areas in rural districts. His proposal was to build these new towns on land held in trust for the community, so that the increment in the land values should be secured for the benefit of the people who created it. The towns were to be limited in extent and were to be surrounded by an agricultural belt. LETCHWORTH was established in 1903 by a joint stock company with a nominal share capital of £300,000, entitled to a cumulative dividend of 5 per cent. The property purchased consisted of 3822 acs. at a cost of £160,378. On this area a town of 30,000 inhabs. was planned; the company undertook the construction of roads, drainage, water, gas, and electricity supplies. The complete town was planned in outline before building started, and provision was made for residential, commercial, and industrial areas and for an agricultural belt surrounding the town. Land was let on lease, the freehold being retained by the company. Building started in 1904, and at the present date (1931) there is a pop. of approximately 15,000, with many industries employing a large proportion of the inhabs. The industries include engineering, printing, bookbinding, furniture, wireless apparatus, corsets, scientific instruments, and many smaller industries. The town is attractive and is visited by many thousands of people every year. The local government is in the hands of an Urban District Council, which was created in 1919. A feature of

Letchworth is that there are no new licensed premises for the sale of intoxicants, though the company has retained the small inns that existed in the two villages on its outskirts. Letchworth was largely financed by mortgages and debentures. In 1918 it started paying dividends on its ordinary capital, and is now paying the accumulated dividend for past years. The undertaking must be regarded as thoroughly sound financially.

WELWYN GARDEN CITY was established by a joint stock company in 1920 with the nominal share capital of £250,000, entitled to a cumulative dividend of 7 per cent. The property purchased consisted of 2378 acs. at a cost of £105,804. The company has issued debentures and has received loans from the Public Works Loan Board under the Housing Act of 1921. The town was planned for a population of 50,000. Building started at once. At the present date (1931) the pop. is estimated at 10,000. Development at Welwyn has been affected by post-War conditions, for it started at a time when the cost of building was at its height. A large proportion of the inhabs. travel to London daily, but a number of important industries has been established, including breakfast foods, films and engineering. A feature of Welwyn is that no shop sites were disposed of by the company in the early stages, the shopping facilities being provided by a subsidiary company; independent shops, however, were started in 1931 in certain trades. Another subsidiary company was formed by licensed premises. Particular attention has been paid at Welwyn to the architecture of the town, and speculative building in the ordinary sense has not been done on any large scale, most of the buildings having been erected as part of definite architectural schemes. There is an agricultural belt, but its area is small. Welwyn is more under the influence of London than Letchworth, as it is much nearer. The lessons that the two garden cities teach are that development of new residential and industrial units is practicable and that they offer an alternative to the ordinary sporadic development in the neighbourhood of towns, and that the preservation of rural England need not entail any arrest of human activities or enterprise even in their most modern forms. Although the term 'garden cities' is sometimes said to have originated in America the American conception of them was not that of Sir Ebenezer Howard, and there has never been in the U.S.A. any development of these cities in the English sense. Garden

villages, or suburbs, in the U.S.A., frequently called garden cities, have been the creation of great industrial companies, which have established new plants in growing towns and housed their employees in homes situated near the factories. There are also so-called garden cities which are high-class residential estates. See *The Building of Satellite Towns*, by C. B. Purdom (1925).

Gardenia. A genus of greenhouse and stovehouse plants, belonging to the order *Rubiaceae*. There are a good many species, but few are grown except in botanical gardens. Much the most popular is Florida as represented by its double white variety, which is a favourite buttonhole flower with those who appreciate its powerful and penetrating fragrance as well as its symmetry and purity. The scent is, however, too strong for some people at close quarters. The plant thrives in a warm greenhouse if the air is kept moist, but it dislikes aridity. Fibrous loam should be the principal component of the compost, lightened with leaf-mould, decayed manure, and sand. Propagation is by cuttings in bottom heat in spring.

Gardening. The development of G. in British and American gardens during the latter part of the nineteenth century was rapid and continuous, nor was it checked by the after effects of the Great War of 1914-18, as were many other branches of art and industry. Rather the contrary, indeed, for the demands of economy led to increased efforts to produce food in the form of fruit and vegetables in home gardens. Moreover, although some owners of large private estates were compelled to reduce their amenities in consequence of heavy taxation, they did not close their kitchen gardens, but devoted them to commercial crops, and in many cases even added to their areas. With respect to flowers, which, if considered as luxuries might be expected to suffer in comparison with food crops, it may be said with confidence that they have become necessities in the lives of both rich and poor, and since flower cultivation can be conducted, despite certain examples to the contrary, at trifling cost, that also has increased in favour. Further factors in the development of G. are the movement in the direction of providing more and more garden cities, parks, open spaces and playing-fields, and state encouragement for allotments. In fine, it is no exaggeration to say that G. is now one of the great influences in national life.

History. Limits of space preclude a lengthy disquisition on this subject, nor is it necessary, in view of the fact that ample information is readily

accessible in such complete and richly illustrated works as *A History of Garden Art* (Dent). It is there shown that G. has been pursued from the earliest ages of which records exist. Nor should it be assumed that the art of the pre-Christian era was mean and crude. Egyptian, Assyrian, Babylonian and Persian monarchs had skilled gardeners in their service long before the days of Virgil. Ancient Egypt, ancient Greece, ancient Rome, all had beautiful gardens. Persepolis and Palmyra, Babylon and Nineveh, Thebes and Memphis, Bagdad, to name but a few great towns of the past, were famous for their parks and gardens. It is probable that Gk. and Rom. G., which in due course spread its influence and gave its lessons to W. Europe, derived in the main from the Near and Middle East, but the Far East must not be overlooked, because gardens were also cultivated in India and China from very early times. The Romans were the chief agents concerned in introducing G. into England, and they instructed the early Britons in the growth and use of many vegetables and fruits hitherto unknown to them. When the Romans were compelled to leave Britain G. languished, but it revived under the influence of the monks after Christianity had been introduced, and a considerable variety of vegetables and medicinal herbs, together with many fruits, were grown. Flower cultivation was little practised at first, but in the three centuries which followed the Norman Conquest there were developments in ornamental culture, and in the Middle Ages gardens gradually increased around the palaces, castles, and granges; walks, terraces, steps, balustrades, summer-houses, statues, lakes and fountains, etc., being formed. Labyrinths became popular. The Renaissance brought a remarkable development in ornamental G. both in France and Italy, and its influences spread to Britain; they were, however, formal. Topiary work, *i.e.* clipping yews, etc., into fantastic shapes, came into fashion. Even in the seventeenth century formalism reigned, and it was left for Bacon, Walpole, Addison, Pope and Whately to condemn the monotonous repetitions of the formal school. Pope, aided by the famous gardener Kent, carried his principles into practice. The latter, with Bridgeman and Capability Brown, established the Eng. or natural system. Briefly this is an imitation of Nature; the most beautiful trees shrubs and flowers for the space required being arranged in as natural and happy a combination as possible. Later, Chambers, Knight, London and others did good

service, while in quite modern times Robinson, Veitch, Wilson, Farrer, Kingdon Ward, Forrest and others exercised great influence as gardeners, writers, or introducers of new plants. (See also GARDEN ART.)

Layout.—Coming to practical matters, it will be obvious that great detail is impossible within the limits of this article, but a few hints may be given. While some operations can be carried out in large gardens which are impossible in small ones, it may be assumed that most gardens have sufficient space for a flower garden, a kitchen garden, and a lawn of greater or less size. Except in very small gardens, ornamental trees and shrubs should be used as freely as possible. Roses should be planted in beds and on walls, arbours and fences. A rockery, large or small according to space and means, is an attractive feature, and a pool for water-plants can often be associated with it to advantage. Herbaceous borders are deservedly popular. In quite small gardens great use should be made of annuals, which can be raised from seeds cheaply. Bulbs may also be planted in autumn or spring according to kind.

Shelter.—Most gardens are more or less enclosed. If hedges form boundaries, they are, in themselves, ornaments to the garden when properly kept. Hedges may be of yew, holly, laurel, box, privet, etc. *Lonicera nitida* is a popular modern hedge plant. Walls should not be left bare, but should be decorated with some ornamental climbing plant or used for fruit trees. There is no wall situated so unfavourably but some plant can be grown thereon, such as Virginia creeper, jasmine, wistaria, clematis, honeysuckle, ivy or rose. Fences may also be made ornamental.

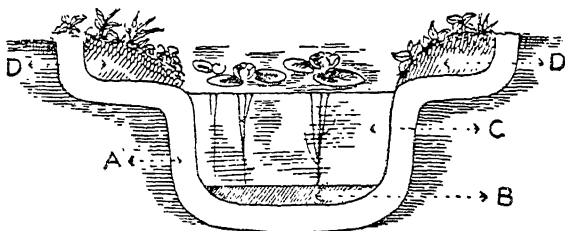
Walks.—For hard wear in all weathers these may consist of concrete, asphalt, ash, tar, macadam or gravel, but grass paths should be provided in suitable places. All hard walks should have a foundation of broken bricks or other rubble to a depth of about 6 in. surfaced with 3 in. or so of ash, with a final top dressing of one of the articles named. The surface should be slightly convex, to get rid of water, and if the subsoil is stiff clay, provision should be made for drainage. Gravel walks should be well rolled occasionally, particularly after rain. A dressing of weed-killer should be used at times in order to prevent the surface from becoming green. If edgings are desired, creosoted wood or ornamental earthenware may be used. Or a plant may be used. Box is not so popular as it was, owing to providing shelter for

slugs, but is still used to a considerable extent.

Lawns.—The lawn occupies a very important place in most modern flower-gardens, and well-kept turf is a valuable feature of the smallest garden. If a lawn has to be made, it can be done with either turf or seed. In either case there must be adequate provision for drainage, either natural, as when the subsoil is gravel or chalk, or artificial, as with clay. If the ground is already covered with fair turf, do not move it without due consideration, but unless levelling is necessary, roll and mow it, and get rid of weeds by spudding or dressing with lawn sand. To form a new lawn from turf, act between Nov. and March inclusive, obtaining good clean turves cut by an expert to a size of 3 ft. by 1 ft., when about ninety will be required per square rod, pole or perch (about 14,500 per acre). The soil

and when these are ameliorated will generally disappear; the other weeds should be treated as recommended above. An annual dressing of fertile soil and manure should be applied.

Herbaceous Borders.—There is nothing better suited to skirt a lawn than a border of hardy herbaceous perennials, and no matter how small the garden it can be provided, the point being to adapt the selection of plants to the area available. Herbaceous (i.e. non-shrubby) plants vary greatly in height and bulk; some require only a square foot of space each, others a yard or more. While large plants should not be put into small borders, small plants may be used for the front areas of large borders, as in many cases they are very beautiful and also easily grown. The following selection of plants will be useful in either case, because the plants marked 'middle' and 'back' are suitable for such



SECTION OF A WATER-LILY POND

A, concrete; B, soil at bottom of pond; C, water; D, D, soil on 'shelves' of sides

should be dug, cleansed of weeds, manured, crumbled, levelled and rolled before laying. Each turf should be made firm. To make a lawn from seed, prepare the soil with equal care, and about mid-Sept. or mid-April (the former for choice) sow a mixture of grass seed from a good firm (who should be told the nature of the soil) at the rate of about 1½ lb. per rod. Protect from birds with scares or lines of thread. The young grass should be rolled with a light roller when it first comes up, and should be cut with a scythe on the first and second occasions, after which a lawn-mower may be used. It is important that the knives of the lawn-mower should be sharp and properly adjusted, otherwise the grass is torn off, not cut, and much damage is done to the young grass. Moss, dandelions, daisies and plantains are the most troublesome weeds on lawns. The first named is caused by defective drainage or inferior soil,

positions in large borders, whilst those marked 'front' will come in handy for the front areas of large borders and the main area of small ones. It will be observed that bulbs are included. Annuals (see separate list) will also prove their worth in small borders:—

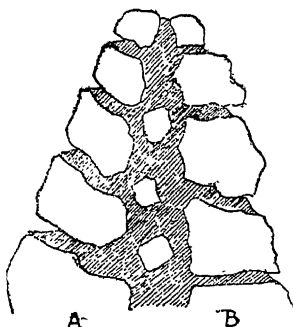
Achillea Ptarmica, The Pearl, (front).
Aconitum (Monkshood) (front). Root poisonous.
Alstromeria (front). Very graceful.
Anemones, Poppy and Japanese, the latter the taller, but both front.
Anthericums (front), very graceful.
Antirrhinums (Snapdragons) (front).
Asters (*Michaelmas Daisies*). *alpinus* and *ericoides* (front, most middle and back).
Aquilegias (*Columbines*) (front).
Bocconia cordata (back).
Campanulas (most front).
Chrysanthemums, *maximum* and *leucanthemum* (middle or back).
Coreopsis lanceolata and *grandiflora* (front).

Delphiniums, nudicaule, cardinale and Blue Butterfly (front, most back).
 Doronicums (front). Early bloomers.
 Eryngium (Sea Holly) (middle and back).
 Gaillardias (front).
 Geraniums sanguineum and pratense (front).
 Geums (front).
 Gypsophila paniculata (Gauze flower) (middle and back).
 Helenium (front).
 Hemerocallis (Day Lilies) (front).
 Helianthus (Sunflowers) (most back).
 Hellebores (Christmas and Lenten Roses) (front).
 Heuchera sanguinea (front).
 Hollyhocks (back).
 Hyacinths (front).
 Inula glandulosa (front).
 Irises (front).
 Kniphofia or Tritoma (Redhot poker) (middle).
 Lobelia cardinalis and fulgens (front or middle).
 Lupinus polyphyllus, hybrids and varieties, splendid (middle).
 Lychnis Chalcedonica, L. Viscaria splendens plena, etc. (front).
 Meconopsis Wallichii, nepalensis, and Baileyi, beautiful Poppies (front or middle).
 Monarda (Bergamot) (front).
 Narcissi (front).
 Enothera (Evening Primrose) (front).
 Pæony, magnificent (front).
 Papaver, perennial Poppies (middle or even front), also nudicaule (front).
 Pentstemons (front).
 Phlox, one or two dwarf varieties, such as Mont Blanc, front, most middle. Invaluable plants.
 Physalis Franchetii (Winter Cherry) (front).
 Pyrethrum (front). Brilliant colours, early bloomers.
 Rudbeckia (front or middle, in rich soil).
 Scabious, including caucasica (front).
 Solidago (Golden Rod), (back).
 Spiræas Aruncus, filipendula and Ulmaria (back); palmata and astilboides, with their varieties (front).
 Statice latifolia (front).
 Tiarella cordifolia (front).
 Trollius (front).
 Thalictrum minus (Maidenhair-like), front.
 Veronica, several species (front).

For full descriptions see *Everyman's Encyclopædia of Gardening*.

The foregoing list shows that there is no lack of hardy herbaceous plants suitable for small borders, and to them may be added crocuses, primroses, polyanthuses, violas, pansies, double daisies, American cowslips and many other pretty things. Most soils can

be made suitable for herbaceous plants, light soils by adding decayed manure and rotting turf (splendid), heavy soil by draining and adding manure and sand. But the best of soil will become exhausted if frequent division is not practised, because the clumps become unduly large. Lifting them every other spring, splitting them up, and discarding the central parts in favour of outside tufts maintains strength and beauty. It follows that spring division is a good means of propagation, indeed most herbaceous perennials can be readily increased thus.



SECTION OF A WALL FOR ROCK PLANTS

A, correctly built, stones so placed that rain will run in; B, incorrectly built, stones so placed that rain will run off

Rockeries.—There is much potential interest and charm in a rock garden, and with intelligent management, care in selection, and due restraint in selecting and placing materials, there need be no hesitation in advising flower-lovers to take action. But it is essential to point out that rock gardening entails a factor which the cultivation of hardy herbaceous borders does not. Whereas the border requires only soil and plants, the rockery calls for stones in addition. Now stones may easily cost more than plants; it therefore behoves the amateur to proceed warily. He will be wise to examine a few different types of rockery before making a start, noting the various kinds and sizes of stones, the methods of arranging them, and particularly how in some cases, by careful choice of site, a comparatively small quantity of stones has been made to give perfectly satisfactory results. A good body of fertile and well-drained soil counts

for more than bulk of stones, as does a wise selection of plants. A sunny position is desirable for most Alpine plants; when arranging the station and placing the stones in position it is not difficult to provide for the limited number of shade-loving plants by giving a north aspect and shade from overhanging stones. An irregular outline and varying contour should be aimed at. Fibrous loam should form the bulk of the compost for most plants, but many enjoy limestone and a few peat and leaf-mould. Most kinds with downy leaves are the better for being covered with small squares of glass in autumn as shelter from heavy winter rains. The following is a useful selection of Alpine plants, and descriptions of the best species, with information on cultivation, will be found in *Everyman's Encyclopædia of Gardening*. Most people will start by purchasing plants from a nursery garden, and as the larger dealers make a practice of growing large stocks of the principal kinds in small pots, it is practicable to obtain and plant at almost any period of the year, subject to local weather conditions. With experience, the amateur will probably find courage to grow a good many kinds from seeds at home, and most of those in the list appended may be so raised at will.

Achillea Clavennae and tomentosa (downy).

Aethionema grandiflora. Pretty rosy flowers.

Alyssum saxatile, many varieties in shades of yellow.

Androsaces carnea, lanuginosa, sarmantosa, etc. Very charming.

Anemones such as alpina and sulphurea.

Anthemis montana.

Antirrhinum asarina, one of the few snapdragons suited to the rockery.

Aquilegia alpina, glandulosa, etc.

Arabises, single and double, white and coloured. Invaluable.

Armeria alpina, etc. Thrifts.

Arnebia cornuta and echioides.

Aubrietias of many kinds. Invaluable.

Campanulas such as *Allionii*, *carpatica* and its forms, *muralis*, *pulla*, *Raineri*, *turbinata*, etc.

Corydalis lutea and *C. nobilis*.

Cyclamen europeum and *neapolitanum*. Like shade.

Dianthus alpinus, *deltoides*, *glacialis*, *superbus*, etc.

Edelweiss.

Erinus alpinus.

Gentiana acaulis, *bavarica*, *Farreri*, *Freyniana*, *septemfida*, *sinoornata*, *verna*, etc.

Geranium argenteum, *sanguineum*, etc.

Helianthemums (Sun Roses) in variety.

Iberis, *gibraltarica*, *sempervirens*, etc.

Iris, *pumila*, etc.

Linarias alpina and *cymbalaria*.

Linum alpinum.

Lithospermum prostratum.

Myosotis *rupicola*.

Onosma albo-roseum.

Papaver alpinum and *nudicaule* varieties (Iceland Poppies).

Pentstemons *glaber*, *Menziesi*, etc.

Polemonium reptans.

Primulas *Bulleyana*, *denticulata*, *japonica*, *rosea*, etc. Invaluable.

Ramondia *pyrenaica*.

Saponaria *ocymoides*.

Saxifrages in great variety, including

Burseriana, *Cotyledon*, *Hostii*, *longifolia*, *oppositifolia*, *Roche-*

liana, etc. Invaluable.

Sedums.

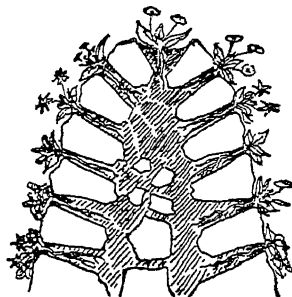
Silenes *acaulis* and *alpestres*.

Soldanellas alpina and pusilla.

Stokesia *cyanea* in variety.

Veronicas *renenas* and *rupestris*.

Violas *cornuta*, *gracilis*, etc.



SECTION OF A WALL WITH ROCK PLANTS

Showing how the plants should be placed

Annual Flowering Plants. In common with other classes of flowers, annuals, hardy and tender alike, have undergone considerable development during recent years, particularly in the cases of sweet peas, *clarkias*, *godetias*, *asters*, *stocks* and (not strictly annuals but generally treated as such) *snapdragons*. The development of sweet peas has been remarkable, and the number of varieties is now almost legion, while cultivation as an exhibition flower has led to what is called 'cordon training,' the plants being grown on single stems like cordon fruit trees. As regards most hardy annuals, however,

the older, time-honoured principles of cultivation apply to-day: fertile deeply tilled soil, thin sowing and subsequent timely thinning of the seedlings, so that the plants cannot get crowded and thereby become attenuated. Nevertheless, failures are not infrequent, because many growers sow too early in spring while the soil is still cold. However good and however finely raked the soil, however thin the sowing, failure is probable unless the soil has been warmed up by adequate spring sunshine. This applies to chalky as well as to clayey soils, because chalk does not warm up quickly. Sowing may be earlier, as a rule, on sandy loams than on either clay or chalk; in any case, local conditions should be considered. The class known as half-hardy annuals is best sown in pots, pans, or shallow boxes and shaded with glass and paper till germination has taken place, then gradually inured to light on a greenhouse shelf or near the glass in a frame. Abundance of air, careful watering (strictly avoiding excess) and timely 'pricking-out' 3 or 4 in. apart in other boxes should then ensure sturdy and healthy plants, suitable for putting out in the garden when summer weather comes; or, at will, potted singly for greenhouse decoration. The following are selections of hardy and half-hardy annuals; detailed descriptions will be found in *Everyman's Encyclopædia of Gardening*.

Hardy Annuals.

Abronia umbellata	Godetias, many vars.
Agrostemma Coeli-rosea	Gypsophila elegans
Alyssum, Sweet	Larkspurs, many vars.
Bartonia aurea	Lavatera rosea
Calendula	Leptosiphons
Calliopsis Drummondii	Limnanthes Douglasii
Candytuft, many vars.	Linarias, in var.
Chrysanthemums, many vars.	Linum grandiflorum
Clarkias, many vars.	Love-in-a-mist
Collinsia bicolor	Love-lies-bleeding
Convolvulus major	Lupins, in var.
Convolvulus minor	Malope grandiflora
Coreopsis (see Calliopsis)	Mignonette, in var.
Cornflower	Nasturtiums, in var.
Eschscholtzias, many vars.	Nemophila insignis
Evening Prim-roses	Night - scented Stock
	Phacelia campanularia

Hardy Annuals (cont.).

Poppies, in var.	Sunflowers
Salvia, Blue Beard	Sweet Peas
Saponarias, in var.	Sweet Sultans
Scabious, in var.	Virginian Stock
Silenes, in var.	Viscarias

Half-hardy Annuals (or plants commonly treated as such).

Acrocliniums (Everlastings)	Marigolds, French and African, in var.
Antirrhinums (Snapdragons), many vars.	Mimulus, in var.
Arctotis grandis	Nemesias, in var.
Asters, Chinese, many types and vars.	Nicotiana affinis and Sanderae
Balsams	Pansies, in var.
Carnations, Marguerite	Petunias, in var.
Celosias	Phlox Drummondii, in var.
Cosmea or Cosmos, in var.	Rhodanthes (Everlastings)
Dimorphotheca aurantiaca	Sapiglossis
Dianthus (Indian Pink), in var.	Schizanthus, in var.
Eccremocarpus scaber	Statice sinuata
Gaillardias, in var.	Stocks, many types and vars.
Golden Feather	Tagetes signata
Lobelias, in var.	pumila
Maize, coloured	Verbenas, in var.
	Zinnias, single and double, in var.

Biennials such as wallflowers, foxgloves, Canterbury bells, forget-me-nots, and sweet williams, suitable for sowing outside in May or June to flower the following year, should also be made good use of.

Roses.—Wherever the atmosphere is reasonably pure, and the soil fairly substantial, roses can be grown successfully. A light dry soil is distinctly unfavourable, although some of the rambling Wichuraiana roses will thrive in shallow chalky ground if well fed at the surface. The deeper, richer and more substantial the soil, the more likely roses are to thrive year after year. In poor ground frequent renewal will be necessary. Another great factor in maintaining health is to keep the plants free from injurious insects and fungi. Shelter without shade is desirable. November is about the best month for planting as a rule. On the whole, bushes are more satisfactory than standards for beds, although the latter have their uses. Liberal use should be made of rambling roses for walls, fences, arbours, and pillars. Ample information on the cultivation and selection of roses will be found in *Everyman's Encyclopædia of Gardening*.

Kitchen Garden.—The requirements of the family and the area of ground

available are two important points. To ensure a constant supply of things in season and yet to have no undue glut at any time calls for a certain amount of forethought. A short calendar of operations for the year is set out below. Full details on growing all crops and checking their enemies are given in *Everyman's Encyclopædia of Gardening*.

January.—All unoccupied ground should be deeply dug. If very stiff it may be laid in ridges. Manure may be wheeled and spread in frosty weather. Manure may also be accumulated for a hotbed. In sheltered places, and with light soil, a spell of dry weather may be taken advantage of for sowing broad beans and peas. Cucumbers, tomatoes, and onions for exhibition may be sown in gentle heat under glass. Asparagus, seakale and rhubarb may be forced if strong roots are available. Get catalogues and order seeds.

February.—Complete the rough digging and manuring of all vacant ground, unless there is snow about. With favourable conditions early peas, broad beans, parsnips, radishes, hardy lettuces and parsley may be sown outside, also onions. Lettuces, celery, tomatoes, melons, cucumbers, and early cauliflowers may be sown in a warm frame or greenhouse. Garlic and shallots may be planted. Potatoes may be planted in frames, with radishes or horn carrots between the rows. Potato 'seed' (sets) should be bought and sprouted in boxes in a light frostproof place. Continue forcing. If mushrooms are to be grown on a hotbed prepare the manure.

March.—Sow turnips, radishes, the main crop of parsnips, horn carrots, summer cauliflowers, early broccoli, the main crop of onions, lettuce, leeks, parsley, early brussels sprouts, broad beans, herbs, mustard and cress, and peas outdoors. Plant early potatoes. Sow celery, gourds, vegetable marrows, cucumbers and tomatoes under glass. Plant asparagus, seakale and rhubarb outdoors. Prick out or pot tomato seedlings.

April.—Horn carrots, savoy, brussels sprouts, broccoli, Scotch kale, cauliflowers, and cabbages may be sown for autumn use. Sow also peas for main crop, onions, lettuces, radishes and endive. Beet should be sown towards the end, in ground which has been deeply dug, but not manured. Plant potatoes, horseradish and artichokes. Towards the end sow dwarf French beans. Plant out box-sown onions. Prick out celery and tomatoes. Plant out cucumbers in houses. Fumigate or vaporise houses as needed to keep insects under control. Divide and

replant mint and other herbs. Sow spinach.

May.—Prepare trenches for leeks and celery. Make the final sowings of winter greens and the final planting of potatoes. Carrots and beet should be thinned to 8 in. apart. Transplantation from seed-beds may be carried on. Early potatoes may have the soil between the rows forked over. Sow runner and dwarf French beans, also peas for succession. Sow celerworts, beetroot, lettuces, turnips, ridge cucumbers and vegetable marrows in the open ground for a late supply. Prune cucumbers and train under glass. Plant tomatoes in sheltered places. Gather early asparagus from outside beds and give liquid manure. Look out for carrot and onion flies and use remedies.

June.—Everything will now be in full growth, and the hoe must be in frequent use. Cucumbers, vegetable marrows, gourds, tomatoes, and capsicums may be put out. Globe beet, early horn carrots, scarlet runners, French beans, lettuces, and radishes may be sown. Thin various crops as needed. Earth potatoes for the first time when about 9 in. high. Finish cutting asparagus.

July.—Clear the ground and dig it over where early crops are coming off. Plant celery, leeks and tomatoes. Plant out brussels sprouts, green colewort, Scotch kale, savoy and broccoli. Take up shallots and garlic as they ripen and store for winter. Make the last sowing of scarlet runners. Lift early potatoes. Fork between and earth late potatoes. Prune and train frame cucumbers. Look out for celery fly.

August.—Cabbages may be sown in the second week, also cauliflowers, the latter to keep over the winter in frames. Tripoli and Giant Rocca onions, endive, lettuce, turnips, and radishes may also be sown. Spray late potatoes if disease appears. Complete the lifting of early crops. Tie up celery and earth as needed. Disbud tomatoes and reduce the lower leaves to help ripen the fruit. Earth leeks. Pick runners regularly.

September.—Winter spinach and lettuce should be thinned out. Earth celery and leeks. Ripen onions off, pull and hang up in the sun. Lift and dry potatoes. Sow the last crop of turnips. Plant out endive. Carrots and beet should be taken up after the first slight frost: but parsnips may be left in the ground till required for table. Pick tomatoes as they colour and continue reducing foliage. Plant spring cabbages.

October.—Complete the lifting and storing of potatoes, beet and carrots. Vacant ground should be trenched.

Complete the planting of spring cabbages. Complete the gathering of outdoor tomatoes. Plant August-sown lettuce in a warm situation. Sow broad beans and peas for next year if the district has proved suitable.

November.—The general work of the garden is of the same character as that of October. Accumulations of old pea-sticks, etc., should be cleared off, as they are resting places for vermin. Peas and broad beans may be sown; see the remarks under October. Clear asparagus beds, prepare for forcing asparagus, sea-kale and rhubarb. Hoe between spring cabbages. Dig or trench vacant ground.

December.—Plant rhubarb, sea-kale, asparagus and horseradish. Continue forcing. Hoe cabbage beds. Protect celery. Examine stored potatoes and destroy diseased tubers promptly. Sow tomatoes and cucumbers in heat if early crops are wanted. Get in manure. Dig or trench ground and leave the surface rough. Make any necessary changes. Cut down the decaying tops of tuberous artichokes. Remove old bean poles and pea-sticks.

Fruit.—By using cordons (single-stem trees) on walls, wires, or wooden frames it is possible to grow a nice selection of apples and pears in most gardens, even if quite small. With ample space available, bushes, pyramids, and even half or full standards can be grown. While cordons will do at 2 ft. apart, most bushes and pyramids need 9 to 12 ft., half standards 15 to 18 ft., and full standards 24 to 30 ft. Cherries and plums are not so well suited to cordon treatment as apples and pears, and wherever possible should be grown as standards, although with plenty of wall space they may also be grown as large fan-shaped trees on walls. Morello cherries are particularly adapted to walls, where they may be trained fan-shape with a framework of main branches widely spaced, and young fruiting shoots grown between. Apples are well suited as bushes and pears as pyramids. Currants and gooseberries as bushes 6 to 7 ft. apart will justify their existence in good soil if properly treated, while raspberries, loganberries, and a considerable range of hybrid berries succeed on wooden or wire frames—raspberries indeed as upright canes a foot apart tied to one length of wire about 4 ft. above the ground. Finally there are strawberries, suitable for planting 2½ ft. apart in beds.

Soil and Planting.—Drained soil is desirable, as stagnant water near the roots is bad. Clay soil should be thoroughly broken up and exposed

to the air several weeks before planting. Light soil should be tilled deeply and given a liberal dressing of manure, with surface dressings (mulchings) of manure every year if possible, in order to encourage surface roots and thereby reduce the risk of canker. Planting may be done between Nov. and March inclusive, but the earlier the better. Strong dressed stakes should be put in with the trees when standards are being planted.

Pruning.—This is too large and complicated a matter to be dealt with fully. Broadly, apples, pears, plums and cherries (except the Morello) bear best on mature wood; and if they are shortened while quite young and a limited number (not exceeding twelve) of widely-spaced branches are trained into an open, shapely head, they will come naturally into bearing in from three to ten years, according to the stock on which they are grafted and the variety. Apples (culinary (c) and dessert (d) for early bearing should be on the 'Paradise' stock and should be such varieties as Early Victoria (c), Stirling Castle (c), Lord Derby (c), Lane's Prince Albert (c), Warner's King (c), Lord Grosvenor (c), Golden Spire (c), Allington Pippin (d), Worcester Pearmain (d), James Grieve (d), Sturmer Pippin (d), and Cox's Orange Pippin (d). Bramley's Seedling (c), and Blenheim Pippin (d) are splendid varieties, but not generally early bearers, nor are they well adapted to cordon training. When the trees have come into full bearing, most apples and pears may have the annual shoots shortened to the clusters of buds which gardeners call 'spurs'; and it is quite a good plan to do this in two stages—a half-shortening about mid-Aug., when, of course, the leaves are still on the trees, and a close pruning in winter. Cherries (except Morello, which bear best on young twiggy shoots) and plums also form spurs, but they do not generally produce so much annual wood when mature as apples and pears, and need scarcely any pruning. Root-pruning is only needed when trees in rich soil are producing masses of coarse wood without flowering. This often happens with young plums and peaches, and sometimes with apples and pears. Baring and shortening some of the coarse, deep-striking roots may do much good in such cases. Red currants and gooseberries respond to the same pruning as apples, black currants to that of Morello cherries. Raspberries do best when fruited on one-year-old wood, older shoots which have fruited being cut out.

For further information on the fruits named, including propagation

and suppression of pests; also for information on cultivating grapes, peaches and other fruits under glass, see *Everyman's Encyclopædia of Gardening*.

Market Gardening, including French Gardening.—Commercial cultivation has developed rapidly during recent years, for not only has the population increased, but the consumption of fruit and vegetables has grown in a greater proportion. To a considerable extent the demand has been, and is still being, met by imports from our Colonies, from the Dominions, and from foreign countries; but home market growers have increased their areas, some private landowners have commercialised their gardens, and many farmers have turned from purely agricultural crops, particularly cereals, to vegetables and fruit. All this naturally means increased competition, and imposes on all persons who contemplate taking up market gardening careful consideration and preliminary study. Particularly is this the case with what is known as French Gardening, for which the cost of outfit is very considerable, approximating £1000 per acre. Sites should be examined with minute care, markets visited, and independent experts consulted.

Garden of the Gods, a dist. of Colorado, United States, in the vicinity of Colorado Springs. It covers about 500 acres, and is remarkable for its strange and extremely beautiful formations of rock, some of which resemble in form cathedral spires, etc.

Gardiner, a city of Maine, United States, in the Kennebec co. It is situated on the Kennebec R., 8 m. S.E. of Augusta. The river is navigable by large vessels as far as this. It possesses a high school, public library and city hall. The manufs. are paper, shoes, etc., and there are saw-mills, machine shops and flour mills. The chief exports are lumber and ice. Pop. 5609.

Gardiner, Alfred G. (b. 1865), Eng. journalist and essayist, b. at Chelmsford. Son of Henry James G., writes under the pen-name 'Alpha of the Plough.' Was editor of the *Daily News* from 1902 to 1919, after which he acted as political adviser to the paper. His *Prophets, Priests and Kings* is a series of entertaining and caustic character-sketches of contemporary celebrities, notably politicians. It was followed in 1913 by *Pillars of Society* in a similar vein and by *War Lords* in 1915. He produced a biography of Sir William Harcourt in 1922 and one of George Cadbury, formerly proprietor of the *Daily News*, in 1923. Has for some

years contributed essays on current topics to the London *Star*.

Gardiner, James, Colonel (1688–1745), a famous Scottish soldier, b. at Carriden, Linlithgowshire. He was severely wounded at Ramillies and, in 1715 took part against the Jacobites in the rising of that year. He became colonel of the Inniskillens and fought at the battle of Prestonpans. Here he was deserted by his men, and slain fighting bravely.



A. G. GARDINER

Gardiner, Samuel Rawson (1829–1902), an English historian, b. at Ropley, Hampshire, and educated at Winchester, Christ Church, Oxford, at Edinburgh, and at Göttingen. He was elected fellow of All Souls' College, Oxford, in 1884, and of Merton in 1892. He held the position of professor of modern history at King's College, London, until 1885. From 1886 to 1889 he was examiner in history to the university of Oxford. He was granted a civil list pension of £150 a year in 1882. G. belongs to the new school of historians who confine themselves to facts, putting aside partisanship and brilliant rhetoric. He has thrown a new light on the Stuart period, to which he devoted years of patient research, often among documents hitherto unstudied. His works include *History of England from the Accession of James I. to the Outbreak of the Civil War*; *History of the Great Civil War*; *Oliver Cromwell*; and *The Thirty Years' War*.

Gardiner, Stephen (1483–1555), an English prelate who became Bishop of Winchester and Lord Chancellor. In 1520 he was made Master of Trinity Hall, Cambridge, where he had studied law. He became also

secretary to Wolsey, and having thus access to Henry VIII., he gained that monarch's favour by supporting his designs. He was sent to try to secure the Pope's consent to the divorce of Catherine of Aragon, and later he conducted the case against the queen. He then became successively Archdeacon of Norwich, Archdeacon of Leicester, Secretary of State, and Bishop of Winchester. He has been looked upon as a blood-thirsty seeker-out of 'reformers,' and certainly he was zealous and consistent, but it is now established that he tried to save the lives of Cranmer and others, and that he was against the persecutions of Mary's reign. Facts seem to prove that he has been much maligned by inaccurate accounts, and that he was not the self-seeking ambitious man whose one aim was to become cardinal and Archbishop of Canterbury. He remained faithful to his religion and suffered long imprisonment under Edward VI. In Mary's reign he was reinstated and made Lord Chancellor. He encouraged learning, and wrote *On Obedience, Explication and Assertion of the True Catholic Faith touching the most blessed Sacrament of the Altar*, etc.

Gardner, a tn. of the U.S.A., in the co. of Worcester, Massachusetts, and 24 m. N.W. by N. of Worcester city. There are manufactures of toys, baby carriages, silver goods, etc., and it possesses the largest chair factory in the world. Pop. 19,399.

Gardner, Ernest Arthur (b. 1862), an English archaeologist, b. in London. From 1887 to 1895 he was director of the British School of Archaeology in Athens, then he became Yates professor of archaeology at University College, London—since resigned. He has written *Ancient Athens*, 1902; *A Companion to Greek Studies*, 1905; *The Inscriptions of Attica*, 1905; *Six Greek Sculptors*, 1910; *Religion and Art in Ancient Greece*, 1910; *The Art of Greece*, 1925; was elected first public orator of the London University in 1910. He is an authority on Greek inscriptions.

Gardner, Percy (b. 1846), brother of the preceding, an English classical archaeologist and numismatist, b. in London. He was appointed assistant in the British Museum in 1871, held the post of Disney professor of archaeology at Cambridge (1880-87), and became professor of classical archaeology at Oxford in 1887. His works include *The Parthian Coinage; Samos and Samian Coins; Types of Greek Coins; New Chapters in Greek History; and Exploratio Evangelica*.

Gardone Riviera, a small winter

resort of Italy, in the prov. of Brescia and 20 m. N.E. by E. of the town of that name. It is situated on the W. side of Lake Garda. Pop. 2000.

Gare-fowl, or **Great Auk** (Icelandic *Geirfugl*, Gaelic *Gearbhul*), a large sea-bird of the family Alcidae, the *Alca impennis* of Linnaeus, similar in appearance to the razor-bill (*Alcatorda*). It inhabited the N. hemisphere (temperate region of the N. Atlantic), but is now practically extinct (since 1844), 'owing to the ruthless trade in its eggs and skin.' The Gs. had wings so small that it was impossible for them to fly, but they were good swimmers. The chief breeding-places were skerries off the coast of Iceland, and Funk Is. off Newfoundland. See S. Grieve, *The Great Auk*, 1885; Milne, 'Relics of the Great Auk,' in the *Field*, 1875.

Gare Loch, an inlet of the Clyde, situated in the S.W. of Dumbartonshire, Scotland. It is about 7 m. in length, and has an average width of a mile. The steamers built in the Clyde shipbuilding yards are frequently brought here for the purpose of testing their compasses. The village of Garelochhead is a holiday resort.

Garfield, a borough of New Jersey, U.S.A., in the co. of Bergen. There are woollen mills and chemical works, also manufactures of clothing, paper and essential oils. Pop. 29,739.

Garfield, James Abram (1831-81), President of the U.S.A., b. at Orange, Ohio, and was forced, owing to the death of his father, to earn his own living at a very early age. He, however, did not neglect his education, and went to Hiram College, Ohio, and from here to Williams College, Mass. He graduated at the latter place and then went back as a professor to his old college. Of this he ultimately became president, and he still continued to study law and to practise. On the outbreak of the Civil War he was appointed to command a volunteer regiment, and by his gallantry and ability quickly raised himself, until he was appointed a major-general. In 1863 he resigned his command and entered Congress, where he was quickly recognised as one of the leaders of the Republican party. He retained his seat in Congress until 1880, when he was put forward as the Republican candidate for the presidency. He was elected and took up office in March 1881. He identified himself with the movement for the reform of the civil service and alienated in this way many of his supporters. In July 1881 he was shot by a disappointed madman who had unsuccessfully sought office, and d. in September. His speeches were

collected into 2 vols. in 1882. See *Life* by Gilmore.

Gargano, a peninsula in the E. of Italy, in the province of Foggia. It extends into the Adriatic Sea for about 31 m., and is from 15 m. to 30 m. in breadth. Monte Calvo is a summit which rises to a height of 5295 ft. and is composed chiefly of limestone. The head of the peninsula is Testa del Gargano.

Gargantua, see **RABELAIS**.

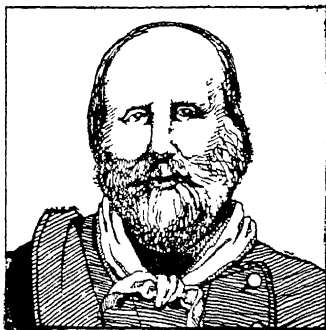
Gargle. The original or proper meaning of this word was a throat wash, but, as commonly used, it indicates a wash for both the mouth and throat. It is used by working the liquid round the mouth and allowing it to trickle down the throat, while the air is driven out of the lungs to prevent the fluid going the wrong way. Gs. may be composed of hot or cold water, either plain or flavoured, such as barley water or orange-flower water. They may also be of glycerine, plain or medicated with alum, iron, tannin, or carbolic acid.

Garhmukhtesar, a tn. of British India. in the N.W. Provinces. It is situated on the r. b. of the Ganges in the dist. of Meerut. The inhabitants are Hindus, with about 25 per cent. Mohammedans. Pop. 8000.

Garhwal, a dist. of the United Provinces, British India. In 1803 it was ruined by the Gürkhas who had overrun it, but in 1814 was taken by Britain, and since then has prospered considerably. There are now very extensive tea plantations. A small native state, separated by the Alaknanda R., remains in the possession of the native rajah. Pop. 490,000.

Garibaldi, Giuseppe (1807-82), a famous Italian patriot, liberator, and guerrilla-leader, b. at Nice. A sailor's son, he took to the sea, commanding a brig by 1830. At this time (c. 1833) he became acquainted with Mazzini and the leaders of 'Young Italy,' and was fired with enthusiasm for the Italian national movement. For his share in the outbreak at Genoa (1834) he was obliged to flee to France. He then sailed to S. America, first serving the republic of Rio Grande do Sul, and then that of Uruguay (1836-48), against the Argentine dictator, Rosas. Returning to Europe, G. took part in the campaign against the Austrians and French, and was the soul of the revolutionary government at Rome. Obligated eventually to retreat to San Marino G. was forced to land before reaching Venice, and his wife perished from exhaustion and exposure in his arms. In 1850 he went as an exile to U.S.A., living for a time in Staten Is. In 1854 he re-

turned and settled in Caprera Is., near Sardinia, eagerly noting the results of Cavour's policy in Italy. He fought for Sardinia against Austria in 1859, and protested against the cession of Nice and Savoy to Napoleon III. in 1860. After the peace of Villafranca, secretly supported by Sardinia's request, G. organised an expedition against the Sicilies, in the hope of bringing about the union of Italy. This is, perhaps, his most famous undertaking. He landed at Marsala with his 'thousand volunteers,' defeating the Neapolitan troops, which far outnumbered his own, at Calatafimi, and thus opened the way to Palermo. G. became dictator of



GIUSEPPE GARIBALDI

Sicily, and crossing to Italy expelled Francis II. from Naples and entered the city in triumph. When Victor Emmanuel, King of Italy, appeared with his Sardinian troops in the kingdom of Naples, G. delivered up to his sovereign his army and absolute sway over the Neapolitan provinces, retiring to Caprera in 1860. He was severely wounded at Aspromonte (1862), fighting against the royal troops, and taken prisoner, but pardoned shortly afterwards. On his second attempt to oppose the papal power (1867) he was utterly defeated by the papal and French troops at Mentana, but was allowed to return to Caprera. In 1870-71 he attempted to help the French Republic against the Germans, commanding the French volunteers in Burgundy. He entered the Italian parliament in 1874, finally consenting to accept an annual pension from it. G. wrote the novels *Clelia* and *Cantoni il volontario*, but had little literary talent. See *Memoirs* (translated by Werner in

1889 as *Autobiography of G. Garibaldi*; Mario, *Garibaldi e i suoi Tempi*, 1884; Stiaelli, *Garibaldi nella letteratura italiana*, 1901; Marriott, *The Makers of Modern Italy*, 1889; Trevelyan, *Garibaldi and the Thousand*, 1909.

Garibaldi, Giuseppe Italian general, b. July 29, 1807, at Melbourne; grandson of the great Giuseppe G. (*supra*), and eldest son of Gen. Ricciotti G. (1847-1924), under whom he fought in Greco-Turkish War of 1897. Fought also in S. African War; lived in S. and Central America and in Balkans. Early in the Great War he raised an Italian legion of 14,000 which fought for France on the Argonne. In 1915 he enlisted in Italy, where he became an officer in the 4th Army. Commanded the Alpine brigade in France, 1918; became brigadier-general. Resigned, June 1919. In 1921 he organised the 'Free Italy Assocn.' against Fascism. Afterwards went to New York.

Gariep, see ORANGE RIVER.

Garigliano, a riv. of Southern Italy, which has its source in Abruzzi, and empties itself into the Mediterranean at the Gulf of Gaeta.

Garland, Hamlin, b. West Salem, Wisconsin, Sept. 16, 1860, graduated at a small college in the state of Iowa, worked on mid-western farms and for a time taught school. He will always have an honourable place in the story of American literature as one of the precursors of the modern realistic school. In his novels and short stories he has taken as his themes the lives of the people on the prairie farms. His books opened the eyes of the city-dwellers to the fact that the lot of the wheat and corn farmer of the middle west was not a bed of roses. Here are depicted the long, sweltering days under the sun, the little that is gained, the narrowness and monotony of the fight for existence. Among his many volumes some of the best are *Main Travelled Roads*, 1890; *Prairie Folks*, 1892; *The Book of the American Indian*, 1923, and *The Trail-Makers*, 1926.

Garlic, or *Allium sativum*, a liliaceous plant which grows wild in S. Europe, especially in Sicily. It is a hardy perennial with bulbous roots, which are much used in cookery and occasionally in medicine.

Garnet, the name of a group of closely related minerals, which crystallise in the cubic system, usually in rhombic dodecahedra or in icositetrahedra, with imperfect cleavage. The chemical composition and hardness vary. Gs. are a good example of an 'isomorphous' group.

They are found in crystalline schists, gneiss, metamorphic limestones, granite, serpentine, and sometimes in volcanic rocks and veins. Their usual colour is red, but there are brown, yellow, green, and black varieties. Of the semi-precious stones used in jewellery, some of the best known are the pyrope or ancient 'carbuncle' (red) from Saxony and Bohemia, the almandine (bluish-red) from Ceylon, Burma, Pegu, Brazil, and Scotland, and the uvarovite (green) from the Ural Mts. (Siberia) and Canada. Finer specimens somewhat resemble rubies in appearance, but common Gs. have many flaws. The 'Syrian' Gs., most esteemed in commerce, came originally from Syriam in Pegu, and sometimes resemble oriental amethysts in colour. Besides being cut as gems, Gs. are used for abrasive and other purposes, garnet-paper being a substitute for sand-paper, especially in America.

Garnet, Henry (1555-1606), an English Jesuit. He was educated at Winchester, studied law, became a Roman Catholic, went to Italy, where he joined the Society of Jesus and acquired a reputation for scholarship, then returned as provincial of the Jesuits in England. He was tried on suspicion of being implicated in the Gunpowder Plot and found guilty, possibly on insufficient evidence, but his zeal in furthering schemes in connection with his order no doubt weighed against him, and he was hanged.

Garnett, Richard (1835-1906), an English writer and librarian, son of Richard G., the philologist. He was b. at Lichfield, and in 1851 was appointed assistant in the reading room of the British Museum, becoming its superintendent in 1875. From 1881 to 1890 he had charge of the preparation of the great catalogue of authors, resigning his post of superintendent in 1884 in order to give all his time to this exacting labour. He introduced the 'sliding press' into the library. He was keeper of the printed books from 1890 to 1899, having been already appointed assistant keeper in 1875. His works include *The Twilight of the Gods and Other Tales*; *History of Italian Literature*; *Essays of an Ex-Librarian*; *William Shakespeare, Pedagogue and Poacher*; *Age of Dryden*; *Lives of Carlyle, Emerson, Milton, Tennyson, and Coleridge*, contributed to the Great Writer series; *Poems Primula*; *To in Egypt*; *Essays in Librarianship and Bibliography*; many articles contributed to the *Encyclopædia Britannica*; and, with Edmund Gosse, *An Illustrated History of English Literature*.

Garnier, Germain, Marquis (1754-1821), a politician and economist, b. at Auxerre. He was educated for the law and was a member of the States-general, which was called in 1789. He retired from Paris in 1792 and did not return until 1795. He took an active part in the politics of the time, and was in 1797 on the list of candidates for the Directory. In 1804 he was made a senator, and in 1808 a count. He was noted for the interest which he took in economics, and his translation and annotation of Smith's *Wealth of Nations* did much to improve the economic literature of France. He was well liked in society, and had some power, writing pleasing verse. After the Restoration he was raised to the peerage by Louis XVIII.

Garnier, Jean Louis Charles (1825-98), a French architect, b. at Paris. It was originally intended that he should become a wheelwright, but he proved to be too delicate for the adoption of that profession and was sent to an architect's office. Here he speedily showed his ability, and at the age of twenty-three he carried off the Grand Prix de Rome. He set off after this to Italy and spent the next few years travelling in Italy and Greece. He returned to Paris in 1853, having already established a great reputation on the Continent. He was not in very affluent circumstances until, in 1861, in open competition, he proved successful with his design for a grand opera house for Paris. The work was not finished until 1875. Amongst other great buildings which he designed are: the Casino at Monte Carlo, and the Hôtel du Cercle de la Librairie at Paris. He was made a grand officer of the Legion of Honour in 1895. Throughout Europe he was recognised as the greatest architect of the age.

Garnier, Joseph Clément (1813-81), a French economist, b. at Beuil; he studied at Paris, and finally became a professor at L'Ecole de Commerce. He afterwards helped to form the Société d'Economie Politique, and became the secretary of this body, a position which he still occupied at his death. The whole of his life was devoted to the study of economic principles and to the bettering of French commercial relations. In 1876 he was elected a senator. Among the more important of his works are: *Traité d'Economie Politique*, 1845; *Richard Cobden et la Ligue*, 1846.

Garnier, Marie Joseph François (1839-73), a French officer and explorer, b. at St. Etienne. He entered the navy, voyaging to the Brazils and then to Cochín-China, where

he served under Admiral Charner. He returned to France for a short time, but again went out to Cochín-China. Whilst here he was the leading spirit in the journey of exploration which was undertaken nominally under the superintendence of a superior French officer but really under the direction of G., who was responsible for nearly all the observations made in a country which had previously been practically unknown to Europeans. The journey was undertaken from Kratie to Shanghai. Before the end of the journey the officer in charge had died, and G. took over the supreme command. He returned to France afterwards and served in Paris during the siege of that city by the Germans. Afterwards he returned to Cochín-China, and then went to China, where he explored the course of the Yang-tze-Kiang. In 1873 he undertook the founding of a French protectorate in Tong-king. He captured the capital, but was slain in subsequent fighting.

Garnier, Robert (c. 1545-1600), a French poet, b. at Ferté-Bernard. He became a law student, and whilst studying law wrote his first poem, which gained him a prize in the prix floraux at Toulouse. He had a distinguished career as a lawyer and great public man, occupying in succession many high positions in Le Maine. He was held to be a great orator and was, even in his own generation, recognised as a poet of more than ordinary merit. Amongst the chief poems which he wrote may be mentioned: *Porcie*, 1568; *Hippolyte*, 1573; *Antigone*, 1580; *Bradamante*, 1582; and *Les Juives*, 1583.

Garnierite, a nickel-containing mineral occurring in New Caledonia. G. is double silicate of nickel and magnesium, containing 24 per cent. of the former metal. Its formula is $2(\text{Ni}, \text{Mg})_2\text{Si}_4\text{O}_{13} \cdot 3\text{H}_2\text{O}$. It is worked upon a large scale in France for the preparation of nickel.

Garnier-Pagès, Louis Antoine (1803-78), took part in the Revolution of 1830, and became a member of the Chamber of Deputies on his brother's death. He was a very prominent member of the Reform party. He was a member of the provisional government in 1848, and afterwards became Minister for Finance. He was a staunch republican, and opposed the restoration of the empire and later the Prussian War. After Sedan he became a member of the government of national defence. He retired into private life in 1871. He wrote *Histoire de la Révolution de 1848*, 1862; and *L'Opposition et l'Empire*.

Garnishee, a person in whose hands

money or property belonging to a debtor or defendant has been attached at the suit of a creditor or plaintiff, and who has had warning or notice of such attachment (*q.v.*). A G., after receipt of such notice, must not part with the debtor's money or property except to answer the creditor's claim or until the attachment is dissolved. But there can be no execution against a G. in respect of such property unless there has been a judgment entered against the principal debtor, and further, a G. is entitled as against the creditor or plaintiff to set up the rights of third parties to whom he himself is under some liability in respect of the property.

Garo Hills, a mountainous dist. of British India, situated southward of Brahmaputra and to the W. of Assam, forming its S.W. corner. The mountains rise to a height of 4650 ft. above sea-level, and have the appearance of parallel ridges, with deep valleys between. The district covers an area of 3270 sq. m., and the inhabitants, the Garos, are a strong and energetic race, darkish brown in colour. The exports are cotton and forest products. Large quantities of coal and petroleum are to be found in the hills. The administrative headquarters are at Tuna. Pop. about 178,000.

Garonne, a riv. of France, which rises in the Vale of Aran, on the Spanish side of the Pyrenees. Its course is generally N.W. Flowing through France, it passes the departments of Haute-Garonne, Tarn-et-Garonne, Lot-et-Garonne, and Gironde. Its tributaries are the Save, Gers, Tarn, Lot, and Dordogne. Below Bordeaux it is known as the Gironde. The river is navigable to Toulouse from Boussens. After a course of 400 m., it enters the Atlantic.

Garonne, Haute, *see* HAUTE-GARONNE.

Garrett (or Almeida-Garrett), Baptista Leitao de (1799-1854), *b.* at Oporto, Feb. 4. Portuguese poet; chiefly notable for his *Auto de Gil Vicente* (1838), which is considered to be the earliest genuinely Portuguese national drama. Among his other works are an epic, *Camoens* (1826); *Adozinda* (1828), a metrical romance; and a *Historical Sketch of Portuguese Literature*. Died at Lisbon, Dec. 10.

Garrick Club, a social and dramatic club which was named after the famous actor and dramatist of the eighteenth century. It was founded in 1831, its avowed objects being 'the general patronage of the drama, and the formation of a theatrical library, with works on costumes, making-up, etc.' The entrance fee is 20 guineas,

and the annual subscription is 15 guineas; membership is most exclusive, only the most successful actors and playwrights gaining admittance. The Club possesses a collection of more than 600 theatrical portraits and other pictures, and numerous theatrical relics. It is situated in a magnificent building, at 15 Garrick Street, W.C.2.

Garrick, David (1716-79), a famous Eng. actor and playwright, descended on his father's side from Huguenot refugees called De la Garrique. He was educated at Lichfield Grammar School and partly under Dr. Johnson, with whom he came to London about 1737. He studied at Lincoln's Inn, and set up in the wine trade with his brother



DAVID GARRICK

for a time, but soon gave up both for the stage. His first public appearance was at Ipswich in 1741, in *Oroonoko*. Later in the year he appeared in his famous rôle of Richard III. He went over to Dublin twice, becoming joint-manager with Sheridan in 1745, and roused much enthusiasm there. Don Felix, in *The Wonder*, was one of G.'s favourite parts, first played in 1756, and also at his last performance, 1776. In 1747 G. and Lacy were joint-managers of Drury Lane Theatre, and G. continued in this office till his retirement (1776). In 1749 he married the Viennese danseuse, Mlle. Violetti. Quarrels among members of his company led to the famous rivalry between Drury Lane and Covent Garden, several of his performers joining the opposition house. In 1750 *Romeo and Juliet* was acted by G. and Mrs. Bellamy at Drury Lane, and by Spranger Barry and Mrs. Cibber at Covent Garden. Drury Lane, however, triumphed in the end. In 1769 G. conducted a notable jubilee in Shakespeare's

honour at Stratford-on-Avon. He did much to restore the original form of that great dramatist's plays and do away with the altered versions then in common use. With him ended the old custom of admitting spectators on the stage itself, and he introduced various other reforms. With Goldsmith, Johnson, Burke, and others, he was a member of the Literary Club. Among his comedies and farces are *The Lying Valet*, *The Clandestine Marriage*, *Lethe*, and *High Life below Stairs*. Selections of his dramatic works were brought out in 1768 and 1798. One of Sir Charles Wyndham's great parts was that of David Garrick in the play of that name (adapted from the Fr. *Sullivan* by Robertson), the last revival being at his theatre in 1900. Consult *The Private Correspondence of D. Garrick* (Boaden's edition), 1831-32; Davies, *Memoirs*, 1780; Blais, *Biografia di D. Garrick*, 1840; Lives by Fitzgerald (1868), Murphy (1801), and Knight (1894).

Garrick Theatre, in Charing Cross Road, London, W.C., was first opened by Sir John Hare in April 1889 with Pinero's *The Profligate*. It must be distinguished from the G. T. opened in Whitechapel in 1830, which was rebuilt in 1845 and used for *opéra bouffe* as late as 1879. Some of the more important plays produced at the present theatre were Grundy's *A Pair of Spectacles*, 1890; Pinero's *Lady Bountiful*, and Robertson's *School*, 1891; Grundy's *A Fool's Paradise*, 1892. Pinero's *The Notorious Mrs. Ebbsmith* was produced in 1895, in which year Mme. Réjane appeared here in *Mme. Sans-Gêne* and *Ma Cousine*. Some of the most successful productions before and during the war were Hope's *Pinkerton's Peerage*, 1902; *Where the Rainbow Ends*, 1911; *The Double Mystery*, 1914; *Tiger's Cub*, 1916. A very notable performance of *Cyrano de Bergerac* was given after the Armistice, with Robert Loraine in the name part, in 1919. In more recent times Eden Phillpott's *The Runaways* was performed in 1928; *The Lady with a Lamp*, Jan. 1929; *The Stranger Within*, June, 1929; *Happy Families*, October, 1929; *My Wife's Family*, 1931.

Garrison, William Lloyd (1804-79), American philanthropist, leader of the abolitionists in the anti-slavery struggle. He early became a journalist, writing for the *Herald*, the *Salem Gazette*, and other papers. In 1826 G. became editor of the Newburyport *Free Press*. He edited the *National Philanthropist*, 1827, and published at Boston the *Liberator*, a journal urging the abolition of slavery in the south,

from 1831 to 1865. He was much influenced by Lundy, and joined him at Baltimore, 1829, in editing the *Genius of Universal Emancipation*. In 1832 he founded the 'New England Anti-slavery Society,' the first of many similar organisations. 'The American Anti-slavery Society' was formed in 1833 in Philadelphia. Of this G. was president, 1843-65. His extreme views made him many enemies and his life was often threatened, but he lived to see his hopes in great part realised. He published *Thoughts on African Colonisation*, 1832, and *Sonnets and Other Poems*, 1843. *The Words of Garrison*, appeared in 1905. Consult *W. L. Garrison: Story of his Life told by his Children*, 1885-9; Smith, *The Moral Crusader*, *W. L. Garrison*, 1892; Crosby, *W. L. Garrison, Non-resistant and Abolitionist*, 1905. See **ABOLITIONISTS**.

Garrotte (Sp. for cudgel) is an appliance which is used in Spain for the execution of criminals. The condemned man is seated on a scaffold fastened to an upright post by an iron collar (the G.) and a knob worked by a lever dislocates his spinal column. Garrotting is the name given in England to a form of robbery which became rather common in 1862-63. The Act of 1863 which imposed flogging for this offence put a stop to it.

Garstang, John (b. 1876), British archaeologist. Educated at Blackburn Grammar School and Oxford University. Has been engaged in archaeological research since 1897, notably on Rom. sites in Britain, in Egypt, Nubia, and Asia Minor. After the Great War he was appointed Director of the Palestine Gov.'s department of Antiquities, which he was instrumental in founding in 1920. From 1927 he has devoted himself to archaeology as Rankin Professor at Liverpool University. Is leader of the Marston archaeological expedition to Jericho and his discoveries there (1930-31) have afforded the strongest evidence of the authenticity of Old Testament narratives. (See also **JERICHO**.) Publications: *Roman Ribchester*; *The Third Egyptian Dynasty*; *A Short History of Ancient Egypt* (in collaboration with Professor Percy Edward Newberry); *The Land of The Hittites*; edited bulletins of the British School of Archaeology in Jerusalem.

Garston, a seaport on the Mersey about 6 m. S. of Liverpool. It has a quay about a mile long fitted with special machinery for the shipping of coal, which is the chief article of export. Pop. 28,539.

Garter King-of-Arms, one of the officers of the Order of the Garter, the others being the Prelate, Chancellor,

Registrar, and Gentleman Usher of the Black Rod. See HERALDRY.

Garter, Order of the, was instituted by Edward III. about 1344. The colour of the emblem chosen was blue, and the motto *Honi soit qui mal y pense*. St. George was its special patron, and it has been called the Order of St. George. Originally there were to be 25 knights-companion, excluding the king, who were to assemble every year on the eve of St. George's Day in St. George's Chapel. Later distinguished foreigners were admitted into the order. The ensigns of the order at first consisted of garter, surcoat, mantle, and hood, later the collar and George, the star and the under-habit were added. The order has for its emblem the *garter*, which is made of dark blue velvet about an inch wide, with the motto in gold letters, and is worn on the left leg a little below the knee. The mantle now worn is of purple velvet lined with white silk, having on the left shoulder the *badge* of the order, a silver escutcheon charged with a red cross for the arms of St. George and encircled with the garter and motto. The surcoat and hood, which is now worn on the right shoulder, are made of crimson velvet. A cap, ornamented with ostrich-feathers and a tuft of black heron's feathers fastened by a clasp of diamonds, is now worn instead of the hood. White silk stockings and white shoes with red heels completed the costume. The *collar*, introduced by Henry VII., consists of knots of cards alternated with red and white roses, and a figure of St. George piercing the dragon hanging from one of the roses. The *star* introduced by Charles I. is a badge with the cross of St. George encircled by the garter, the whole being surrounded by rays of silver. The under-habit was introduced by Charles II. Each knight has his stall in St. George's Chapel, Windsor, and the garter plates of the knights remain permanently. Those placed there in the reign of Henry VII. are valuable heraldic relics. The order still ranks first among the orders of knighthood of Europe. Knights of the Garter write K.G. after their names.

Gartokh, or **Gartok**, a tn. in Great Tibet in the Nari-Khorsum prov. It stands at a height of 14,240 ft. above the sea in one of the loftiest mountain regions in the world. To the E. of the town are salt-mines, and the important gold-mining district of Thok-Jalung lies 85 m. to the N.E. An active trade is carried on in shawl wool, tea, etc. In accordance with the Tibet Treaty of 1904, it was thrown open to British trade. In winter G. consists of only a few dozen

people, but in summer trade passing through makes it a busy place.

Garvie, Alfred Ernest, religious author; b. Aug. 29, 1861, at Zyrardow, Russian Poland, and educated privately and at George Watson's College, Edinburgh—graduating at Glasgow University with first-class honours in philosophy in 1889. He took his M.A. at Oxford in 1898, and hon. D.D. Glasgow in 1903. Minister of Macduff Congregational Church, 1893-95, and 1895-1903 of Montrose Congregational church. Professor of philosophy of theism, comparative religion and Christian ethics in Hackney and New Colleges, London, 1903-07. Principal of New College, Hampstead since 1907. His publications include: *The Ethics of Temperance*; *My Brother's Keeper*; *The Christian Certainty*; *The Gospel for To-day*.

Garvin, James Louis, British, b. April 12, 1868, at Birkenhead, Cheshire. Began journalism on *Newcastle Chronicle*, was its leader-writer and literary critic 1891-99. From the age of twenty-six he contributed to the *Fortnightly Review*; later, to *National* and the *Quarterly*. Went to London 1899, and joined the staff of *Daily Telegraph*. In the North he had been known as an Irish Nationalist, a fervent admirer of C. S. Parnell. Subjected by his new Conservative surroundings, he came into prominence as chief journalistic backer of Joseph Chamberlain's 'Tariff Reform' in 1903. Edited the *Outlook* weekly, 1905-06. In 1908 became editor of the great Sunday newspaper, the *Observer*. In 1910, for a brief while, he returned to his faith in Irish Nationalism; but, on the breakdown of the Conference, he called on the country to 'break with the Dollar Dictator' (i.e. John Redmond). He was editor of the *Pall Mall Gazette*, 1912-15. An adverse critic of the Treaty of Versailles. Editor-in-chief of 13th and 14th editions of the *Encyclopædia Britannica*. Has published *The Economics of Empire*, *Imperial Reciprocity*, 1903; *Tariff or Budget*, 1909; *The Economic Foundations of Peace*, 1919.

Gas and **Gases**. The word 'gas' was invented by J. B. van Helmont (c. 1640) to describe the gas now known as carbon dioxide. It was formerly supposed that the word was derived from the Dutch *geest* (German *geist*), spirit, but that this is an incorrect view is shown by Van Helmont's words: 'I have called this spirit *gas*, as it is not distinguishable from the Chaos of the ancients.' The term is now used to describe one of the three states of aggregation of

matter. In simple language, these three states of aggregation may be defined thus: 'A solid has volume and shape; a liquid has volume, but no shape; a gas has neither volume nor shape' (Sir Oliver Lodge). 'Vapour' is the term applied to a gas, which by comparatively small changes of temperature or pressure, may be liquefied. The first gas to be studied in detail was atmospheric air. It was established in the seventeenth century by Rey and Mayow that the increase in weight which a metal undergoes during burning in air is due to a combination of the metal with some constituent of the atmosphere. The recognition of this important fact and its full significance was greatly retarded by the influence exerted by the phlogistic school (see Phlogistic Theory under *History in CHEMISTRY*). The discovery of oxygen by Priestley and Scheele, and of nitrogen by Cavendish, failed conclusively to determine what happened during combustion, until these facts were interpreted by Lavoisier, who gave the first satisfactory explanation of the phenomena of combustion, and thereby established the principle now known universally as the conservation of mass. The early workers on the nature of gases (or 'airs' as they were then called) were Cavendish, Black, Scheele, and Priestley, and to their credit must be set the discovery of oxygen, hydrogen, nitrogen, carbon dioxide, oxides of nitrogen, etc., and the investigation of their properties.

Towards the end of the nineteenth century, several 'rare' gases were identified and isolated by Ramsay and Travers and other workers. These gases are argon (now used in gas-filled lamps), krypton, xenon, neon (familiar in advertising signs) and helium (found first in the sun and subsequently on the earth near radioactive springs).

The properties of gases have been studied extensively, and the fruits of these investigations are (a) the atomic theory of matter, (b) the kinetic theory of matter, (c) the electrical theory of matter. Dalton, Gay-Lussac and Avogadro are associated with the important discoveries that led to the first theory; Bernoulli, Maxwell and Clausius with the second theory; while J. J. Thomson and Rutherford are two of the most famous scientists associated with the discoveries that established the third theory.

There are four fundamental rules or laws governing the behaviour of gases, viz:—

1. *Gay-Lussac's law*.—The volumes of reacting gases bear a simple rela-

tion to each other and to the volume of the resulting product.

2. *Boyle's law*.—The volume of a given mass of gas varies inversely as its pressure, provided that its temperature remains constant. Mathematically this is stated as follows: $PV = a$ constant, where P is the pressure and V is the volume of the given mass of gas at the given temperature.

3. *Charles' law*.—The volume of a given mass of gas increases by $\frac{1}{273}$ of its volume at 0°C . for a rise of 1°C ., when the pressure of the gas is kept constant.

4. *Avogadro's law*.—Equal volumes of all gases measured under the same conditions of temperature and pressure contain equal numbers of molecules.

The above laws apply to 'perfect' gases (see below) only. They are approximately obeyed at ordinary temperatures and pressures by the so-called 'permanent' gases, e.g. oxygen, air, hydrogen, helium, etc., that are only liquefied at temperatures far below 0°C .

Kinetic Theory of Gases (q.v.).—The striking successes of this theory are (i.) the explanation of the pressure, volume and temperature relations of a gas mentioned above, (ii.) the determination of the sizes, speeds and 'free paths' of the molecules of gases, (iii.) the explanation of the phenomena of viscosity, diffusion and conduction of heat in gases, (iv.) the explanation of the specific heats of gases, and (v.) the interpretation of the laws of thermodynamics (q.v.). The mathematical calculations underlying this theory begin by postulating a *perfect gas*, viz.: a gas whose molecules are assimilated to perfectly elastic particles of negligible dimensions that exert no force of attraction on each other. These molecules are in constant motion, and their velocities are only changed when they collide with each other. The molecules travel in straight lines between collisions. Subsequently the properties and behaviour of real gases are explained, and the following data give an idea of some of the results of this theory: (1) *diameter of molecules*: hydrogen 2.4×10^{-8} cm.; oxygen 3.0×10^{-8} cm.; nitrogen 3.2×10^{-8} cm.; helium 1.9×10^{-8} cm.; (2) *average velocity* at 0°C . of molecules: hydrogen 162,800 cm. per sec.; oxygen 42,000 cm. per sec.; nitrogen 45,400 cm. per sec.; helium 120,400 cm. per sec.; (3) at 0°C . and 760 mm. of mercury pressure, the number of molecules in 1 c.c. of a gas is 2.9×10^{19} . Some idea of the state of affairs in a gas may be gathered from the fact that a mole-

cule suffers something like 8000 million collisions per second. The walls of the containing vessel are bombarded by the molecules of the gas and this bombardment accounts for the phenomenon of the pressure exerted by a gas. At the absolute zero of temperature (see below) the molecules of every substance are at rest relative to each other.

Densities and molecular weights of gases.—Since equal volumes of gases under the same conditions contain equal numbers of molecules, the densities are in the same ratio as the molecular weights. This principle of Avogadro furnishes a method of determining molecular weights of substances in the gaseous condition. If hydrogen be taken as the unit in determining densities, then since the molecular weight of hydrogen is 2, the molecular weights of gases are twice the respective densities. In order to determine the density of a gas two methods are available, (1) by weighing a known volume of the gas, (2) by measuring the volume of a known mass of gas. The former method is the most usual, and is carried out by weighing a globe or vessel (whose volume is previously determined by weighing it full of water) full of the gas at a known pressure, and then re-weighing it after it has been exhausted by means of a molecular pump. When the density of one gas has been determined, that of any other can be found by comparing its density with that of the first gas. This comparison can be made very accurately by means of the micro-balance. The micro-balance consists essentially of a light balance beam delicately pivoted inside a glass vessel that has two outlet tubes attached to it and a manometer for measuring the pressure of the enclosed gas. The beam itself has a solid piece of quartz fixed on one end and a larger hollow quartz ball on the other end, so that when the vessel is filled with a gas, the upward thrust of the gas will be greater on the hollow ball than on the solid piece of quartz (Principle of Archimedes). The denser the gas the greater the difference between the upward thrusts on the two halves of the beam. The first gas is introduced, and the pressure p_1 required for equilibrium of the beam is recorded by the manometer. The vessel is then exhausted and filled with the second gas, and the pressure of the latter is adjusted to p_2 , in order again to restore equilibrium of the beam. Hence at pressure p_2 the second gas must have the same density as the first gas has at pressure p_1 . Now Boyle's law tells us

that if the temperature remains constant the pressure of a gas varies directly as its density. Hence the density of the second gas at pressure p_1 will be $d_2 = \frac{p_1}{p_2} d_1$, where d_1 is the known density of the first gas at pressure p_1 .

In order to determine the density of a vapour, Victor Meyer's method is used. It consists essentially in volatilising a small known mass of the substance, and collecting and measuring its volume by the volume of air it displaces from the apparatus. Vapour densities are of importance in determining the molecular complexity of substances. Hydrogen, chlorine and nitrogen, for example, are shown to be diatomic, *i.e.* to contain two atoms in the molecule. Zinc, cadmium and mercury, on the other hand, are monatomic. It is interesting to notice that in many cases the number of atoms in the molecule varies with the temperature. In the case of sulphur, for example, the vapour density at 500° C. shows that there are six atoms in the molecule, whilst at 1100° C. there are only two atoms in the molecule.

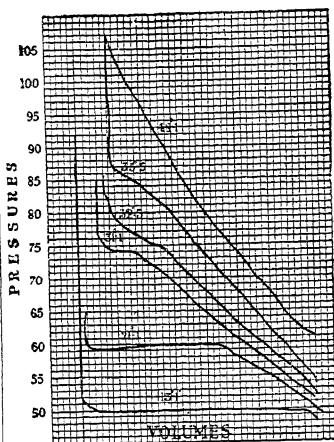
Specific Heats of Gases (see SPECIFIC HEAT).—The first law of thermodynamics (*q.v.*) tells us that work (*q.v.*) may be performed at the expense of heat energy, and that the amount of work so performed is equivalent to the amount of heat energy supplied to do this work. When a gas is heated it may expand and do work; in this case only part of the heat supplied will be available for raising the temperature of the gas. As the gas may be allowed to expand in an infinite variety of ways, it follows that when a given amount of heat is supplied to a given mass of a gas its rise of temperature may be one of an infinite variety of degrees. In other words, a gas has an infinite number of specific heats. Two of these are of considerable importance, *viz.*: the specific heat of a gas at constant volume and the specific heat of a gas at constant pressure. For hydrogen $C_p = 3.41$; $C_v = 2.40$, where C_p and C_v are respectively the specific heats of a gas at constant pressure and constant volume. For monatomic gases, the kinetic theory of gases deduces that $C_p/C_v = \frac{5}{3}$; for diatomic gases $C_p/C_v = \frac{7}{5}$; for triatomic gases $C_p/C_v = \frac{9}{7}$. Although these theoretical deductions are made for perfect gases, the success of the theory may be gauged from the following typical results for this ratio for gases that approximate to a perfect gas under ordinary conditions: argon (monatomic) 1.667;

hydrogen (diatomic) 1.407; nitrous oxide (triatomic) 1.324.

Diffusion of Gases (see DIFFUSION). Diffusion takes place more readily in gases than in solids or liquids, by reason of the greater velocities of the molecules in the gaseous state, and because the force of attraction between the molecules of a gas is exceedingly small. Graham's researches on the diffusion of gases led to the conclusion that the rate of diffusion is inversely proportional to the square-root of the density of the gas. Hydrogen, being the lightest gas, will diffuse most quickly, but when any gases are mixed together, diffusion results in a uniform mixture of the gases. In this way the noxious gases produced in industrial centres are rapidly distributed and the composition of the air is thereby maintained almost constant.

Liquefaction of Gases.—When a gas contained in a vessel is subjected to a continually increasing pressure, the volume may continually decrease, the contents remaining homogeneous, or a separation into gas and liquid may result. The deciding factor is the temperature. It has been found that for every gas there is a temperature, known as the *critical temperature* above which it is impossible to liquefy the gas however much it is compressed. The behaviour of gases during compression is well illustrated by the case of carbon dioxide, which was studied exhaustively by Andrews. In the accompanying diagram the abscissæ represent volumes and the ordinates pressures. The curves are known as *isothermals* (q.v.), and represent the changes that take place when carbon dioxide is compressed at constant temperature. Reference to the diagram shows that when the gas was compressed at a temperature of 13.1°C ., separation of liquid carbon dioxide began at a pressure of 48.9 atmospheres. Condensation continues without further increase of pressure until liquefaction is complete, after which the volume of the liquid decreases only slightly for a large increase of pressure. Similar results were observed at 21.5°C ., but when the compression took place at a temperature of 31.1°C ., no abrupt changes of volume were noticed and there was no separation of liquid. Similarly, at higher temperatures no liquefaction takes place; indeed, Andrews found that it was impossible to liquefy carbon dioxide at any temperature above 30.92°C ., which is therefore known as the critical temperature for this gas. The pressure required to cause liquefaction at this temperature is called the *critical pressure*. Although the prob-

lem of the liquefaction of gases received early attention and the possibility of the liquefaction of air was vaguely hinted at by Lavoisier, the cause of the 'resistance' offered by the so-called permanent gases was not understood until the above critical phenomena had been explained. The early experimenters included Mouge and Clouet, who liquefied sulphur dioxide, Davy and Faraday, who liquefied chlorine, and Bussy, who in 1824 showed that when liquid sulphur dioxide was allowed to evaporate a much lower temperature was obtained. This observation has been of prime importance in



later work on the liquefaction of gases, for it has enabled experimenters to cool the 'recalcitrant' gases below their critical temperatures when liquefaction can be obtained by compressing the gases sufficiently. Cailletet in 1877 liquefied oxygen and carbon monoxide by subjecting the gas to a pressure of 300 atmospheres, cooling it by evaporating sulphur dioxide, and then suddenly releasing the pressure. Pictet also succeeded in liquefying oxygen, and thought he obtained evidence of having prepared liquid hydrogen. Wroblewski and Olszewski in 1883 liquefied oxygen, previously cooled by liquid ethylene at -130°C ., and then liquefied hydrogen previously cooled by liquid oxygen. Many of the so-called permanent gases were also solidified. More recent work is that of Linde, Hampson, Dewar and Kammerlingh

Onnes. The same principle was adopted by each worker, viz.: the gas is compressed and then cooled. After cooling it is allowed to expand by passing through a porous plug (Joule-Thomson effect), whereby the temperature is further reduced. The cold gas is used to cool more of the compressed gas, and the process of cooling continues at 'compound interest,' until finally liquid is formed. The last gas to be liquefied was helium (Kammerlingh Onnes, 1908). It is interesting to note that this gas and other rare gases were isolated by the fractional distillation of liquid air. The following are the boiling-points of some of the so-called permanent gases under a pressure of 760 mm. of mercury: hydrogen -252.7°C. , oxygen -183.0°C. , nitrogen -195.8°C. , argon -185.7°C. , helium -268.0°C. Liquid gases are stored in *Dewar glasses* (thermos glasses), which are double-walled, the space between the walls being evacuated in order to minimise conduction and convection of heat to the liquid, and the inner surfaces of the walls are silvered in order to prevent radiation to and from the liquid gas.

Van der Waals' Equation.—The 'characteristic' equation for a perfect gas, obtained by combining the laws of Boyle and Charles, is $PV = RT$; P = pressure, V = volume, R = a constant, and T = absolute temperature of the gas. The value of R depends on the mass of gas under consideration; for a mass of gas equal to the molecular weight in grams it has the value 8.3×10^7 , where the volume of the gas is measured in c.c., and its pressure in degrees per sq. cm. T is measured from the absolute zero of temperature, viz.: -273°C. , the lowest possible temperature, since the molecular velocities of all substances would vanish at that temperature. Real gases—even the so-called permanent gases—only obey this equation approximately at ordinary temperatures and pressures, whilst at temperatures not far above their critical temperatures, or at high pressures, the deviations from the behaviour of a perfect gas are serious. This is due to two causes. (1) the molecules of a real gas are of finite size, (2) the attraction exerted by the molecules on each other is not zero. The importance of these two factors is relatively small when the pressure of the gas is small and the temperature is considerably above its critical temperature, for then the volume occupied by the incompressible material (the molecules themselves) is very small compared with the volume occupied by the

gas, and the distance between the molecules is relatively great. A vapour is defined as a gas at a temperature not far removed from its critical temperature, and its properties differ considerably from those of the perfect gas. Van der Waals' equation is an attempt to obtain a characteristic equation for a real gas—an equation that will be true for all temperatures and pressures, so that it does not differentiate between a gas, a vapour and a liquid, but attempts to account for the observed differences in their properties. This equation is $(P + \frac{a}{V^2})$

$(V - b) = RT$. a and b are constants for the gas. We can compare this equation with that of the perfect gas, viz.: $PV = RT$, and interpret the term $\frac{a}{V^2}$ as representing the effect

on the pressure of the molecular attraction resisting the expansion of the gas. The constant b cannot differ considerably from the liquid volume; it is in fact equal to four times the total volume of the molecules. These terms are relatively unimportant at ordinary temperatures and pressures for gases like air, hydrogen, etc., and hence these gases approximate to perfect gases under such conditions. Qualitatively, Van der Waals' equation has been successful in accounting for the deviations from the perfect gas laws, and for the existence of a critical temperature. Its quantitative success is fairly good for carbon dioxide, but its success for other gases is not striking. Following Van der Waals' many attempts have been made to obtain a characteristic equation for a fluid, and of these the equations proposed by Clausius, Chappuis, Dieterici and Lees are the most noteworthy.

Bibliography.—Preston's *Theory of Heat* (4th ed.) 1925; Birtwistle's *Thermodynamics*, 1925; Bloch's *Théorie Cinétique des Gaz*, 1921.

Gas Cooker. The earliest attempts to use gas for cooking were made about 1835, when J. Sharp constructed ovens heated by gas for cooking and baking. In one that he constructed for a Leamington hotel a cook prepared a dinner for 100 persons. The ordinary gas cooker consists of an oven surmounted by a hot-plate. The ovens are generally constructed of enamelled steel and are double walled, the intervening space being packed with non-conducting material. In modern gas-ovens the burners are thermostatically controlled and when once set for a given cooking-operation can be relied upon to maintain an even temperature.

Hot-plate burners have been very much improved recently, and give a much higher efficiency. The top bars of the hot-plate should not come in contact with the flames.

Gas Engines belong to the *internal combustion* type of engine. All heat engines act through a working substance, which by expanding and contracting under the influence of heat and cold, converts a large amount of the heat energy communicated to it into mechanical energy. In the majority of heat engines, the heat energy is supplied by the combustion of fuel from the outside, and has to pass through a heating surface before it reaches the working substance. These, of course, are *external combustion* engines, and the steam engine is characteristic of this type. In G. E., however, the working substance is the fuel together with a certain quantity of diluting air, and, therefore, the heat energy is converted into mechanical energy directly in the one chamber. It is thus easy to see why the term *internal combustion* applies to G. E. The theory of thermodynamics (*q.v.*) proves that only a definite fraction of the heat energy supplied to any machine can be converted into mechanical energy. The more efficient the machine is, the greater is the fraction, and with an increase in the range of temperature the working substance is subject to, a corresponding increase is obtained in this fraction. Now because there is no heating surface through which the heat energy has to travel, higher limits of temperature can be attained with a G. E. than with a steam engine. Therefore a greater thermal efficiency, *i.e.* the ratio of the heat energy converted into mechanical energy to the heat energy supplied, can be obtained with a G. E. than with a steam engine.

From 1823 to 1860, Brown, Wright and Barnett, amongst many others, made attempts to produce a practical engine to work by the explosive combustion of gas. Yet, although their efforts, as in all pioneering works, foreshadowed in many ways the lines along which the successful engine now runs, still no practical efficient engine was evolved until 1860. In this year an engine was designed by M. Lenoir which proved to be the first G. E. which could be seriously considered. In construction this resembled an ordinary single cylinder horizontal steam engine. Slide valve worked by eccentrics controlled the admission of air and gas and the escape of the resultant products of combustion to the air. As the piston moved forward it drew in an explosive mixture of air and gas, and at mid-stroke the inlet valve closed and

the mixture was ignited by an electric spark. During the remainder of the stroke, work was done because of the rapid rise of pressure of the hot products, and simultaneously the products of a previous explosion on the other side of the piston were expelled. In the course of the backstroke, the products formed by the explosion described were expelled, and a fresh explosive mixture drawn in on the other side, and so on. To keep the cylinder cool, and to allow lubrication, the cylinder was surrounded by a water-jacket; and it may be noted here that this water casing continues to be a feature of all modern G. E. An indicator diagram from Lenoir's engine is shown in Fig. 1.

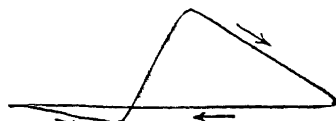


FIG. 1.—LENOIR CYCLE

The action takes place in the direction shown by the arrows.

The irregular curve downwards represents the gas and air being drawn in at an almost uniform pressure. Then there is a rapid rise of pressure as the mixture explodes, shown by the steep curve upwards; after which while the products (and to a slight extent the continuation) of the combustion continue to expand, the pressure gradually diminishes, hence the more gradual downward curve. Finally the backstroke expels the products at atmospheric pressure as represented by the horizontal line. On account of its excessive consumption of gas, which was nearly 100 cubic feet per horse power per hour (about five times the quantity used in a modern G. E.) this engine was soon superseded. This large and uneconomic consumption was due, in the first place, to the small expansion of the explosive mixture; and further the pressure on the piston was so low that the engine was large in proportion to the work it was capable of performing.

Another of the earlier engines which deserves consideration was that designed about 1867 by Otto and Langen. This engine had a vertical cylinder, and the piston-rod was so geared that it only drove the shaft on the downstroke. The explosive mixture was taken in on the upstroke, and ignited by means of a gas flame. The expansion being very rapid, the piston rose very rapidly, since it did

no work on the upstroke. As the burned gases cooled, the pressure fell below the atmospheric, with the result that the piston was forced down and by means of the clutch gear drove the shaft. This engine was very noisy, but the consumption of gas was less than a half of that of the Lenoir engine.

In 1876 an idea was utilised by

Finally, the second backward stroke expels the products of combustion through the exhaust pipe into the atmosphere. Thus the strokes might be described as (1) *charging*, (2) *compressing*, (3) *working*, and (4) *exhaust*.

Fig. 3 shows the Otto cycle diagram. AB represents the first or charging stroke of the cycle, when

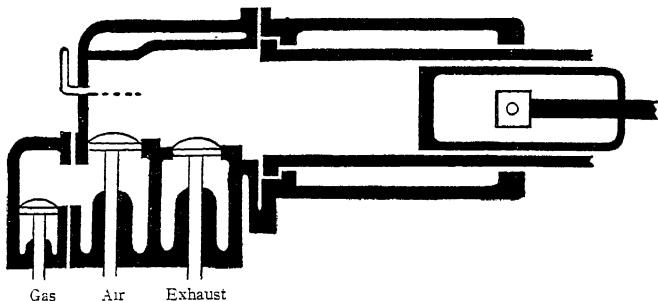


FIG. 2.—SECTION THROUGH OTTO CYLINDER

Otto, which revolutionised the G. E. and made it an efficient and practical rival to the steam engine. The principle had been laid down very thoroughly in 1862 by Beau de Rochas, and even in 1838 had been suggested by Barnett, but it was left to Otto to apply the idea practically. The innovation consisted in the compression of the explosive mixture in the cylinder previous to ignition. This necessitates a greater expansion of the explosive products before they are reduced to atmospheric pressure and expelled; consequently, a greater efficiency is secured, and the higher pressure of the charge results in a greater horse power being developed by an engine of a given size. The action of an Otto engine may be understood from reference to Fig. 2.

The cylinder of an Otto engine is usually horizontal and single acting, and it requires two revolutions of the piston shaft, or four strokes of the piston to complete the action. In the diagram above, the piston is shown commencing the compressing stroke. During the first forward stroke, the gas and air are drawn in by suction through the valves shown, and in certain definite proportions. On the first backward stroke this mixture is compressed into the clearance space behind the piston. When the crank reaches a dead point, the mixture is ignited, and work is done by the expansion of the heated gases on the second forward stroke.

the mixture is being taken in at what is practically atmospheric pressure. BC, then, corresponds to the compression stroke. Ignition takes place at C, and the pressure rapidly rises as shown by the steep curve to D. DEF indicates the working stroke. From D to E indicates the ordinary expansion and consequent gradual fall

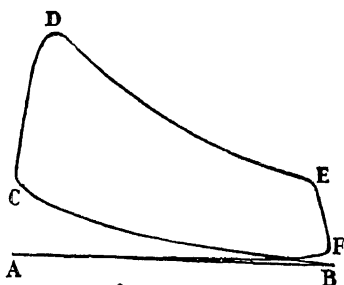


FIG. 3.—OTTO CYCLE

of pressure. Towards the end of this stroke, the exhaust valve opens, allowing the waste gases to escape, with the resultant sudden decrease in pressure, as shown by EF. So CDEF represents the full effect of the working stroke. Then as the piston moves back over the exhaust stroke, and gradually sweeps the chamber clear,

the pressure falls back to the atmospheric level, as shown by F.A.

Because only one of the four strokes required in an Otto cycle does work, a large fly-wheel running fast is employed to act as a magazine of energy; if the speed must be kept constant, as in electric lighting, then two fly-wheels are used. Further, a centrifugal governor is used to control the engine by cutting off the supply of gas when the speed becomes too great. Much attention has been given to the governing of modern gas-engines. There are two chief systems: (a) quality governing and (b) quantity

by means of a slide valve. This moved backwards and forwards across the back end of the cylinder, by means of a side layshaft, geared to run at half the speed of the main shaft. This valve admitted the gas and air and carried an igniting flame to the cylinder through a small opening from a chamber where a gas jet always burned. The exhaust valve in this engine was of the mushroom type. Now, however, because of the high temperatures and pressures at which modern machines run, the slide valve is replaced, as shown in Fig. 2, by lift valves, all of the mushroom

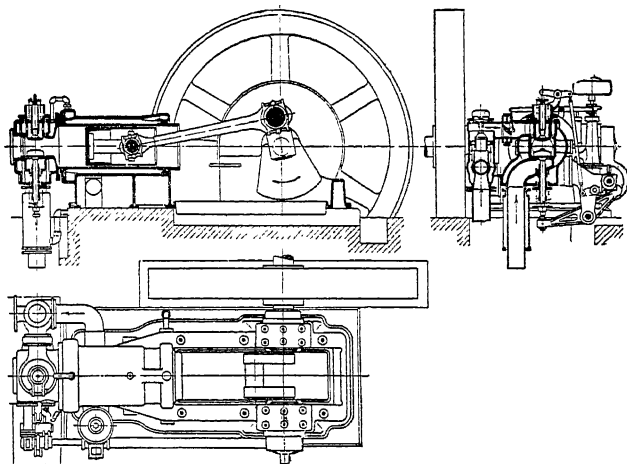


FIG. 4.—SINGLE-ACTING KÖRTING GAS ENGINE

governing. Under the heading of quality governing there is the variable quality and the hit and miss methods. In both cases the compression is kept constant. In the hit and miss the air valve opens as usual but the gas-valve remains closed when the load is light. The method leads to irregular speeds. In variable quality governing the opening of the gas-valve by the governor is controlled by the load on the engine. Quantity governing gives an even turning moment. The mixture is kept constant and the compression varies with the load. An impulse is given every working stroke. Various modifications of the working parts of the Otto engine have been made which improve its action without disturbing the principle. The original Otto engine obtained its ignition

type. Further, in a number of modern engines, flame ignition has given place to tube ignition. A small closed tube of porcelain or metal is kept red hot by a Bunsen flame, which continually plays around it. Some of the explosive mixture is allowed access to this tube from the motor cylinder at the proper moment. This method of ignition has itself been superseded in most engines by either low (for engines over 12 h.p.) or high tension spark ignition, produced by a magneto driven by the lay-shaft. Both high and low tension ignition methods have gear for advancing and retarding.

From the fact that the piston does not travel to the end of the cylinder but leaves a space called the *clearance* it is evident that a large amount of the heated gases will be left in the

cylinder. This is expelled in a variety of ways. This 'scavenging' or sweeping out of the exhaust gases may be done by forcing air through the cylinder. In the Crossley engine, the momentum of the moving column of gases in the exhaust pipe is made to cause an inrush of air, by setting the air and exhaust valves so that, for a short while, they are open together. For large G. E. it is necessary to have some means of setting the machinery in motion. In some machines, an explosive mixture is introduced into the cylinder, and they are thus started off by a small explosion. In others the valves are so arranged that, for a while before they stop, the G. E. are converted into air compressors; while to others small air compressors are attached.

There is now a large number of

machines. The *Westinghouse* engine is a vertical one, working on the Otto cycles, but with the cylinders arranged in tandem, so that the suction or charging stroke of one is the working stroke of the other. Because of this arrangement, one crank is driven by each pair of cylinders, and so an impulse is obtained for each revolution. Another G. E. which might be mentioned is the *Premier*, which has two cylinders placed one behind the other, with the back piston connected to the front one by a water-cooled piston-rod. In this engine the explosions alternate, one cylinder being charged while the other is working. *Atkinson's* engine has not a direct drive, for the crank is worked by a toggle-joint, which causes the piston to make four unequal strokes for each revolution.

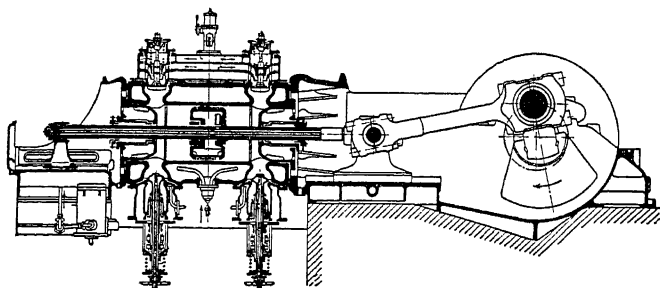


FIG. 5.—DOUBLE-ACTING DEUTZ GAS ENGINE

different G. E. manufactured. *Clerk's* engine is similar to that described above, but an explosion occurs at each forward stroke because exhaust ports are placed near the front end of the cylinder, so that the waste gas can escape and a fresh mixture be pumped in as the piston advances. In the *Griffin* engine, an explosion takes place at each end of the cylinder, but only after every third stroke. The *Körting* G. E. is either single or double acting. In any double-acting machine, the piston is about half the length of the cylinder, and explosions occur on both sides of it. When the piston is at either end of its stroke, exhaust ports around the centre of the cylinder are left uncovered, and when the piston is in this position, a charge of air from the air pump sweeps the heated gases away. Thus two impulses are obtained for each revolution. The accompanying illustration (Fig. 5) will serve to illustrate the working of such double-acting

Nowadays, economical running of a G. E. may be obtained by using producer and blast furnace gases for supplying the power. Modern horizontal gas engines run at speeds of about 300 r.p.m. for 10 B.H.P. engines to about 200 r.p.m. for 100 B.H.P. High speed vertical engines run at speeds of 1000 r.p.m. These gases have not the heating value of coal gas, but they are cheaper, and enable the cost of working of a G. E. to compare favourably with that of a steam engine. One of the great disadvantages of G. E. consists in the necessity for a water jacket, since this involves a great waste of heat. The temperature of the heated gases is higher than the melting point of iron and yet the temperature of the engine must be kept low enough to prevent oil burning. Thus a great deal of the heat developed—about 25 per cent. in the best engines, and as much as 50 per cent. in some—is wasted, although various attempts have been made to

recover the heat from the exhaust-gases. The exhaust-gases are generally passed into a series of boxes or chambers to muffle the sound of the exhaust. Arrangements are made to drain away the condensate. When engines operate on town gas, antifucltuators or gas-bags are provided so that the suction stroke of the engine shall not affect the pressure in the mains. But although such a large amount of the heat is lost, yet the G. E. is almost twice as efficient as the steam engine from the thermodynamic standpoint. On the other hand, a steam engine

Gas Fires. As a fuel, gas is clean, and produces neither soot nor smoke; being free from ash, it does not produce dirt. The temperature of a gas-heated room is under perfect control, and when the fire is needed it is possible to obtain a radiation efficiency in about ten minutes, which a coal fire would take five times as long to reach. The modern gas fire, in which the radiants have a temperature of about 900°C . from bottom to top, is very efficient, and also very different in appearance and construction from the older types. The faults of the old types of gas

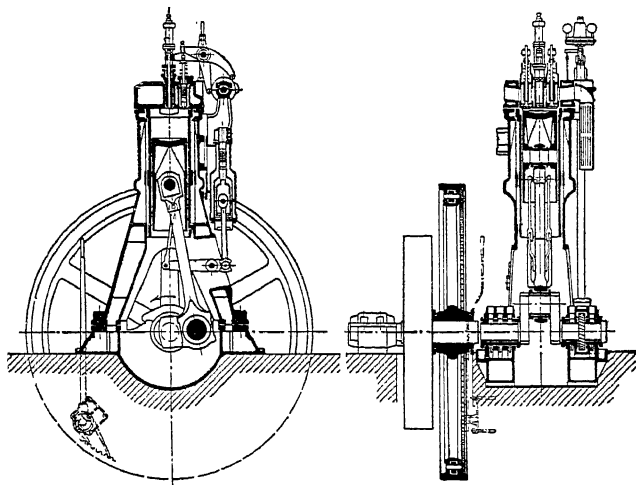


FIG. 6.—SINGLE-CYLINDER DIESEL VERTICAL GAS ENGINE

costs much less than a G. E. to run, but the compactness and convenience of the latter, and the ease and economy with which they can be run irregularly, are great advantages. Smaller sizes are started by hand, larger sizes have a pump bolted to the starter block and worked by hand. The longest engines have a compressed air starter-set.

On the Continent G. E. have been used for propelling tramcars, the gas being stored in compression cylinders, but the main development of internal combustion engines for traction has, of course, been by means of oil and petrol engines (*q.v.*) See D. Clerk, *The Gas, Petrol, and Oil Engine*; Norris, *The Gas Engine*; H. Allen, *How to Design a Gas Engine*, and *Gas and Oil Engines*.

fires were, according to Davidson, (a) low thermal efficiency, (b) convected heat too great, causing dryness of air, (c) inadequate ventilation owing to small flues, (d) flames irregular and noisy. The modern gas fire eliminates all these troubles, while the pillar type of fuel ensures complete combustion with a maximum of radiant heat, together with satisfactory ventilation. The radiant efficiency is over 50 per cent., while the convected heat is about 15 per cent.

It can be taken for granted that, given a properly fitted gas fire, none of the products of combustion, although harmless, escapes into the room. This is tested for by the Davis Shadowgraph Test, in which a cold glass plate is held close to the canopy of the fire. The slightest trace of

products causes a deposit of moisture on the plate. The design of the modern 'fuel' is important, and, apart from entire lack of interference with the flames, it is composed of materials which emit rays of definite wave-lengths, as in the case of the new Thermo-X Beam radiants. From an artistic viewpoint the gas fire can be made to suit any taste or harmonise with any scheme of decoration.

Gas, Light and Coke Company. One of the two great companies which supply London and parts of the area around it with gas. It operates mainly on the N. side of the Thames, leaving the S. side to the S. Metropolitan Gas Company. The G. L. and C. C. has an authorised capital of £25,887,909 and powers to borrow large sums beyond this. It was incorporated under Royal Charter in 1812, and the present Governor is Sir David Milne-Watson. During its history it has absorbed several similar undertakings, such as those at Grays, Pinner and Brentford, and at the time of writing is promoting a Bill that will give it powers to bring the gas companies of Brentwood and Southend-on-Sea into amalgamation. As is the case with other gas companies, the amount of its dividend depends upon the cheapness of the gas. The standard is fixed at 4 per cent. on a basic price of 11.4d. per therm, and two fifteenths per cent. may be paid in additional dividend for each fifth of a penny per therm that gas falls in price. This Company was among the most enterprising in meeting the competition of electricity for lighting purposes by developing the use of gas for cooking and heating.

Gas-liquor, the watery fluid which, together with coal-tar (*q.v.*), forms the liquid product of the distillation of coal. This liquor, which separates as a layer above the tar, consists chiefly of a solution of ammonium salts, partly condensed from the hot gases and partly derived from the subsequent washing of the gas in the 'scrubbers.' The carbonate and chloride are the most important of the salts present, and occur to the extent of about 4 and 1.5 per cent. respectively. Smaller quantities of the sulphide thiosulphate and sulphate are also present. G. is the most important source of ammonia from the commercial point of view. This product is obtained from it by decomposing with lime, and blowing over the ammonia with steam. If the sulphate, which is largely used as a fertiliser, is required, the gas is passed into sulphuric acid, and the salt crystallised out.

Gas Manufacture, Gas is made by the destructive distillation of that variety of coal, rich in hydrogen, known as bituminous coal. A typical bituminous coal has the following composition: Carbon 77 per cent.; hydrogen 5 per cent.; sulphur 1.7 per cent.; nitrogen 1.7 per cent.; oxygen 7 per cent.; ash 3.5 per cent.; moisture 3.4 per cent. Little is known of the way in which these elements are combined, so that the ordinary analysis of a coal is no criterion of its value for gas-making purposes. This can only be arrived at by trial on a practical scale.

The products of the distillation of coal may be divided into three main classes: (a) Solids such as coke and gas carbon; (b) liquids consisting of tar and ammoniacal liquor; (c) gases consisting of the unpurified coal gas. The coal tar contains, among many other bodies, (1) Benzene and its homologues, from which aniline, the source of coal tar colours, can be derived; (2) carboxylic acid, from which picric acid, used as a dye and a powerful explosive, is made; (3) naphthalene, used for disinfecting; (4) pitch, extensively used for road-making. From the products obtained by the distillation of the tar (*q.v.*) many valuable drugs, perfumes and colouring matters are obtained.

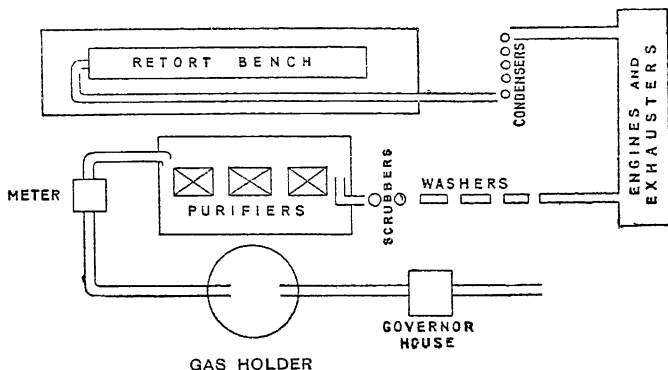
The gases may be divided into (1) light yielding hydrocarbons such as methane, acetylene, ethylene; (2) combustible diluents such as hydrogen, carbon monoxide; (3) impurities such as sulphuretted hydrogen, carbon disulphide, carbon dioxide, ammonia.

The series of operations involved in G. M. embraces the processes of distillation, condensation of the products of distillation which are liquid or solid at atmospheric temperature, exhaustion of the uncondensed gas from the retorts, wet purification by washing with water, dry purification, estimation of the volume of the purified gas and distribution to the mains from which the customer draws his supply. From the accompanying diagram an idea of the order in which operations in G. M. are carried out, and the arrangement of the plant, can be gained.

The *retorts* are made of fire clay or silica; their cross sections are usually D-shaped, a form adopted on account of the large heating surface presented by the base and the fact that it remains unchanged after continued heating. To the open ends of each retort a cast-iron mouthpiece is bolted; this carries a socket to receive the pipe through which the gases pass after leaving the retort. The retorts are

heated externally, being arranged in 'beds' of from three to twelve. Each bed of retorts has a separate furnace. The heating of the retorts is done by either the 'direct' or the 'regenerative' system, the latter being much superior to the former, which is now becoming extinct except in small works. In the regenerative system air passes through red-hot coke in a furnace placed below the bed of retorts. The oxygen of the air is converted into carbon monoxide, and the mixture of carbon monoxide and nitrogen enters the combustion chamber surrounding the retorts at a high temperature; it is here supplied with sufficient air to complete the combustion of the carbon monoxide

electrically-driven charging machine in which the centrifugal force produced by a rapidly revolving fly-wheel is applied to force the coal into the retort. It has the advantage of producing a layer of coal of uniform thickness in the retort. For discharging the coke a rake driven by hydraulic power or compressed air is made to enter the retort and withdraw the coke on returning. The use of a telescopic ram which pushes the coke before it and discharges it at the other end has the advantage over the rake method that the discharge of the coke is quite complete in one stroke of the ram. In many large gas works the retorts are set at an incline in order to charge them by the action



GROUND PLAN OF GAS WORKS

to carbon dioxide, a reaction which is accompanied by the evolution of a great quantity of heat. It is usual to have an admixture of steam with the primary air supply which forms carbon monoxide and hydrogen by contact with the hot coke. This system of heating possesses the following advantages: (1) A great economy of fuel; (2) a high temperature; (3) a uniform distribution of heat around the retorts. With a good modern regenerative setting it is possible to carbonise 100 lb. of coal by the use of only 12 lb. of coke.

Charging retorts.—Formerly, and at present in small gas works, the retorts were charged by hand; men used a shovel or scoop for placing the coal in the retort and a rake for withdrawing the coke formed. In large gas works this is now done by machinery driven by compressed air or hydraulic or electric power. A device recently introduced is an

of gravity. The coal is elevated to hoppers and is then dropped into feeding chambers which are arranged so that they can travel from one end of the retort house to the other and feed the coal into the retorts. When the retort is to be charged the lower open end is provided with an iron stop and the door is closed. The shoot, down which the coal falls from the feeding chamber, is fitted into the upper open end of the retort and the door which keeps the coal in the feeding chamber is opened; the coal falls into the retort, rushes down the incline, is arrested by the iron stop and piles up, thus forming a continuous backing to the coal following. To withdraw the coke, the door closing the lower opening is opened, the stop removed, the coke in the lower part of the retort stirred to overcome a slight sticking to the sides of the retort; the whole mass then shoots out. To prevent the scattering of the flowing

stream of red-hot coke guides are used. The large preliminary outlay on mechanical appliances and the great wear and tear to which they are subjected have discouraged the general adoption of this method, but it undoubtedly secures a greater economy in the cost of carbonising the coal than any other method.

Vertical retorts.—The inclined retort which has played a very important part in G. M. during the past twenty years has proved the connecting link between the early horizontal retort and the new methods of carbonisation. Since the reduction in the parliamentary standard of candle power, owing to the almost universal adoption of the gas mantle for lighting purposes, gas engineers have displayed great activity in developing new processes of carbonisation which are all characterised by the adoption of vertical retorts. Much larger charges can be used with vertical retorts than had been possible with the horizontal and inclined retorts, and, moreover, gravity can be utilised to the full for charging and discharging them. There are three systems of carbonisation by vertical retorts which are distinguished by the names of their inventors: (1) The Dessau system; (2) the Woodall-Duckham system; (3) the Glover-West system.

The first installation of the Dessau verticals in this country was at the Ayres Quay works of the Sunderland Gas Company. The installation consists of a bench of six beds; each bed consists of ten retorts arranged in two rows of five. The dimensions of each retort are 13 ft. 1½ in. long, tapering from 9 in. by 22½ in. at the top to 13½ in. by 27½ in. at the bottom. The complete installation is capable of carbonising 58½ tons of coal every 24 hours, and yields, with steaming, 720,000 cubic ft. of gas a day. Each retort carries a charge of a little less than half a ton of coal, which requires 12 hours for carbonisation (including 2 hours of gentle steaming). The process of charging and discharging is intermittent. In the Woodall-Duckham and Glover-West systems there is a continuous descent of the coal through the heated retort, the time of descent and the temperature of the retort being so adjusted that the carbonisation is complete when the charge has reached the bottom of the retort. Very great difficulties were met with in the early experimental stages of the continuous carbonisation of coal, but these have been successfully overcome. For a detailed account of the two systems of continuous carbonisation refer to *The Carbonisation of Coal* by

Lewes, while full particulars of various installations may be found in the *Trans. of the Inst. of Gas Engineers*. It is interesting to note that while vertical retorts may not be suitable for all kinds of coal, yet between 50 and 60 per cent. of the gas produced in England is made in continuous vertical systems. Most vertical retort-systems are arranged for the admission of steam so that a portion of the coke is converted into water-gas *in situ*. The steam is generated by the waste heat of the furnace gases.

Hydraulic main.—The gas passes from the retort to the hydraulic main. This is a long horizontal tank supported above the top of the retort stack, through which is maintained a constant slow stream of water, the level of which is not allowed to vary. The ascension pipe dips about 1 in. into the water, which acts as a seal to allow any retort to be charged singly without the possibility of gas produced in the other retorts of the same bed escaping through the open retort. Some of the high boiling-point constituents in the gas condense in the ascension pipe, which must be periodically cleaned. In the hydraulic main, where the gas bubbles through water, condensation takes place to a still greater extent, and also solution of a considerable quantity of ammonia. The products of condensation form a black, viscous fluid of peculiar smell called coal tar, which is a mixture of an extremely complex character. The tar, being heavier than the ammonia liquor, forms a layer at the bottom of the main, and the ammonia liquor is run off from the top of it at a constant rate into a storage tank. In order that the tar shall not thicken, arrangements are made to remove it continuously by means of Dillamore tar columns. It is now usual to work with anti-dips in order to prevent variation of pressure inside the retorts, and the dip-pipe is only sealed in liquor when the retort-door is opened. The gas leaves the main at a temperature of about 60° C., and is reduced to the temperature of the air by condensers which are air-cooled or water-cooled, or both. Water condensers are more efficient, because the degree of cooling can be better regulated with water than with air. The efficiency of a condenser is judged by the efficacy with which it removes naphthalene; this compound condenses to a white glistening solid which causes great trouble when it is deposited in the works or distributing pipes. Stoppages of pipes due to the deposition of naphthalene in them was one of the greatest trials

of the gas engineer. Some engineers have had recourse to naphthalene washers in which the gas is brought into contact with a heavy tar oil. The naphthalene dissolves in the oil, but some of the hydrocarbon constituents of the gas are also dissolved. To replace these a volatile hydrocarbon is mixed with the oil.

The exhauster.—Since the stream of gas has to work against the pressure of the seal in the hydraulic main, the pressure of the gas in the retort must be greater than the pressure in the combustion chamber surrounding it. Some of the gas would naturally percolate through the porous wall of the retort and be consumed in the chamber. The exhauster is a rotary gas pump which serves the purpose of sucking the gas out of the retort and thus neutralises the effect of the water pressure. The exhauster also serves to force the gas through the purifying plant. The amount of gas produced is increased through the use of an exhauster by about 10 per cent. and, moreover, the quality of the gas is improved, because it leaves the heated retort more quickly. After leaving the condensers, the gas contains the following impurities which must be removed: (1) Sulphuretted hydrogen; (2) carbon bisulphide; (3) carbon dioxide; (4) ammonia. The complete removal of sulphuretted hydrogen is insisted on by Act of Parliament, because one of the products of its combustion is the pungent smelling gas sulphur dioxide. Carbon dioxide is extracted because it is a formidable diluent, but most gas companies are exempt from removing the carbon bisulphide. It pays gas companies to extract the ammonia, because the salts of ammonia have a marketable value. The gas also contains cyanogen compounds, and in large works they are extracted and made use of for the preparation of sodium cyanide or sodium ferrocyanide.

Wet purifiers or washers.—These contain ammonia liquor through which the gas is made to flow in finely divided streams. The compounds hydrocyanic acid, carbon dioxide, and sulphuretted hydrogen are acidic, so they combine with the ammonia (a strong base) to form salts which are non-volatile. The greater proportion of these impurities are, therefore, removed. The final removal of the ammonia is effected in the scrubber. This is a cylindrical tower packed with boards placed on end and close together. Water flows down over the surface of the boards, and the gas flowing upwards against the stream of water is brought into such intimate contact

with the water that practically all the ammonia and sulphuretted hydrogen are removed, whilst a part of the residual carbon dioxide and carbon bisulphide is extracted. The more modern washer-scrubbers are driven mechanically and occupy less space.

Dry purifiers.—The final purification is effected by passing the gas over wooden trays made in the form of grids and covered with the purifying material. Slaked lime and oxide of iron, called 'bog iron ore,' are used as purifying agents. The oxide of iron removes the last traces of sulphuretted hydrogen. Sulphide of iron is formed, and the spent oxide is revived by exposing it to the air, the oxygen of the air displacing the sulphur from the sulphide. When the sulphur has accumulated to the extent of about 50 to 60 per cent. the material does not suffer revivification on exposure to the air; it is then sold to manufacturers of sulphuric acid to be roasted in kilns for the production of sulphur dioxide. The gas passes from the purifier to the gas-holder where it is stored. In small gas works the holder is a simple cylindrical vessel inverted in a tank of water. Large gas works have adopted a telescopic cylindrical vessel, thus saving much ground space, as the same sized tank serves for a holder of much greater capacity than the simple form. The South Metropolitan Gas Company has built a gas holder which has six joints or lifts, the total capacity of which is 20,000,000 cubic ft. The tank for the gas holder is constructed by excavating a circular pit of slightly larger diameter than the tank. The tank must be water-tight; a concrete lining is usually employed to ensure this. The latest type of holder is known as the tankless holder and consists of a tall cylinder or polygon in which the gas is confined by a large sealed piston which rises and falls according to the amount of gas in the holder. Such a holder gives the same pressure whatever the height of the piston. The holders of this type now constructed in Gt. Britain (1931) have an aggregate capacity of about 74 million cubic feet. An advantage of these holders is that, not being stored over water, the gas does not go into the mains saturated with water vapour, as is the case with ordinary holders. In order to prevent the deposition of water in mains and services the modern tendency is to lower the dew-point of the gas by treating it at the works with some dehydrating agent such as calcium chloride solution. The pressure at which the gas is delivered to the consumer is regulated by means of a governor.

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Essentially this is a Lilliputian gas-holder, from the centre of which is suspended a conical-shaped valve. When the holder rises, owing to an increase in pressure, the valve decreases the size of the inlet, and when it sinks the size of the inlet is increased. Thus the flow of gas from the reservoir to the mains is automatically regulated.

Gas for fuel or power is prepared by the incomplete combustion of coal or coke. There are two methods of producing gaseous fuel, entirely different in principle: (1) Air is passed upwards through a deep layer of red hot carbon. The carbon combines with the oxygen of the air to form carbon monoxide, CO. The nitrogen of the air is unaffected, so the resulting gas consists of a mixture of carbon monoxide and nitrogen with a small percentage of carbon dioxide, CO₂. This mixture is called *producer* or *Siemens' gas*; (2) Steam is passed through the red-hot carbon, when the following reaction takes place, $C + H_2O = CO + H_2$. The mixture of CO and H₂ is called *water gas*, which evidently differs from producer gas in that it is wholly combustible. The reaction by which water is produced is endothermic in character, because the amount of heat required to decompose 1 gram molecule of steam is greater than the amount of heat liberated when C combines with O to form CO. This explains why steam directed upon incandescent coke will produce water gas only for a very short time. The heat required for the reaction is absorbed from the hot coke which is cooled to such an extent that at first a gas of different composition from water gas is formed, and quickly the process ceases altogether. This difficulty is overcome by blowing air and steam alternately through the coke for periods of a few minutes each. During the first stage the carbon is converted into carbon dioxide, a reaction which liberates a large amount of heat. This heat is employed in raising the temperature of the remaining mass of fuel which soon attains the temperature appropriate for the reaction $C + H_2O = H_2 + CO_2$. This reaction, being endothermic, abstracts heat from the hot fuel which cools down, so that the process must be reversed by blowing air in, and so on. Hence in all processes for the manufacture of water gas, two alternating operations are involved: (1) The temperature of the fuel is raised to about 1200° C. by blowing a current of air through it; (2) steam is injected until the temperature falls to about 900° C. If the temperature falls below 900° C. the reaction $C + 2H_2O = CO_2 + 2H_2$ pre-

dominates. Dowson gas is prepared by a combination of the methods used in generating producer gas and water gas. Air and steam are injected simultaneously into a mass of red hot coke. The amount of steam introduced must not exceed the quantity which can be decomposed into H and CO at the expense of the heat generated by the action of the oxygen of the air on the carbon. It is cheaper than water gas, but is inferior in heating power; it contains 50 per cent. of nitrogen, and only 15 per cent. of H and 25 per cent. of CO. For detailed description of the plant for manufacturing producer gas and water gas, see *Modern Gasworks Practice*, Meade (Benn Bros. 1930).

Gas Meter. The gas meter was invented about 1815 by Clegg. Consumers' gas meters are either 'wet' or 'dry.' The wet type has a measuring drum enclosed in a case containing water up to a level known as the water-line. The drum, which contains division plates set at an angle, is caused to revolve by the gas pressing upon the surface of the water, arrangements being made to compensate for fluctuations in water level due to movement of the drum. The rotation of the drum spindle is communicated to a train of wheels and registered on dials.

The dry meter, which is much more extensively used, usually has a case of tinned iron, and is divided into one horizontal and two vertical compartments by division plates. In each vertical compartment is a movable diaphragm with prepared flexible leather sides, thus making four chambers in the lower part of the meter. The gas enters and leaves the chambers alternately through valves which are made to open and close at the correct time. The alternate expansion and contraction of the diaphragms, like ordinary bellows, by the pressure of the gas is communicated by levers and cranks to the recording mechanism. There are various forms of 'prepayment' or 'slot' meters for extending the sale of gas among the smaller consumers. By means of a simple mechanism attached to the meter, and operated by the insertion of a coin, an amount of gas appropriate to the value of the coin is allowed to pass through the meter, after which a valve closes until another coin is inserted.

Meters, as tested under the provisions of the Sales of Gas Act, 1859, are stamped as correct when their registration does not vary from the standard by more than 2 per cent. in favour of the seller or 3 per cent. in favour of the consumer, a total range of 5 per cent.

Large meters on gasworks are usually of the wet type, although other kinds such as the Venturi, the rotary, and the Thomas electrical meters have found application. The latest type is the Connersville positive displacement meter in which accurately fitted rotors are driven by the gas to be measured.

Gascoigne, George (c. 1525-77), an Elizabethan poet and dramatist, the son of Sir John G. He was educated first at Canterbury and then went to Cambridge. On his return to London he became a student at Gray's Inn. He led a wild and reckless life, and was disinherited in consequence by his father. He then joined Sir Humphrey Gilbert and took service under the Prince of Orange against the Spaniards. On his return he accompanied Queen Elizabeth on one of her royal progresses, and to celebrate the event wrote a masque entitled *The Princely Pleasures of Kenilworth Castle*. In 1576 appeared his well-known satire in blank verse, *The Steele Glas*. He is also the author of *The Supposes*, a translation of the *Suppositi* of Ariosto, and the earliest extant comedy in English prose; *Jocasta*, a version of the *Phœnissæ* of Euripides, the second earliest tragedy in blank verse; *Glassey of Government*, and *Complainte of Phylomene*.

Gascoigne, Sir William (c. 1350-1419), a judge; eldest son of William G., b. in Yorkshire. In 1397 he became one of the king's serjeants and was appointed attorney to the banished Duke of Hereford. He was made chief justice of the King's Bench in 1400, and in 1403 was commissioned to raise forces against the insurgent Earl of Northumberland. The stories told about him, that he committed Prince Henry for contempt of court and that he refused to judge Archbishop Scrope on the ground that he had no jurisdiction over spiritual persons, prove that he was regarded as a just judge, possessed with a high sense of the dignity of his office and indifferent, in the pursuit of his duty, to his personal interest.

Gascony (Fr. *Gascoigne*), an old prov. in the S.W. of France. It derived its name from the Vasques, or Vascones, a Spanish tribe which crossed the Pyrenees about 580. It now forms the departments Landes, Gers, Hautes-Pyrénées, and part of Basses-Pyrénées. Formerly it was a dependency of Guienne, and its capital was Auch. Part of it belonged to the sovereigns of Navarre, and it was united to France in 1598.

Gaskell, Elizabeth Cleghorn (1810-65), a novelist. b. at Chelsea. She was the daughter of William Stevenson, a Unitarian minister. Most of

her youth was spent at Knutsford, Cheshire, and this quaint town supplied her with her material for *Cranford*. In 1832 she married the Rev. William G., a Unitarian minister of Manchester, and the marriage proved a very happy one. In 1848 she became famous by the publication of her novel, *Mary Barton*; the book was a great success and was praised by Carlyle, Maria Edgeworth, and Landor. She was a friend of Dickens, and was intimate both with Carlyle and Thackeray. It was at Dickens's invitation that she wrote for *House-*



ELIZABETH CLEGHORN GASKELL

hold Words, and in this paper appeared, in 1853, *Cranford*, which, according to Lord Houghton, is 'the purest piece of humorous description that has been added to British literature since Charles Lamb.' Other works of hers are: *North and South*, 1855; *Life of Charlotte Brontë*, 1857; *Sylvia's Lovers*, 1863.

Gasolene is that fraction of petroleum boiling at about 115° F., and is used for burning in vapour lamps, as a fuel in internal combustion engines, and as a solvent in the arts. See PETROLEUM.

Gasometer, see GAS MANUFACTURE.

Gasparri, Pietro, Italian cardinal; b. May 5, 1852, at Ussita. Educ. Pontifical Seminary, Rome. Professor of Canonical Law, Catholic Institute, Paris, 1880-98. In 1898, went to S. America as apostolic delegate. In America until 1901. Entrusted, 1904, by Pius X. with codification of canonical law. Cardinal, Dec. 16, 1907. Secretary of State since Oct. 1914. Began, 1926, negotiations leading to treaty between Vatican and Italian Gov.; signed it, Feb. 11, 1929.

Gasquet, Francis Aidan (1846-1929), an historical writer, *b.* in London. He was educated at Downside College, Bath, and from 1878 to 1884 was superior of the Benedictine Monastery and College of St. Gregory, Downside. Up to his death was the abbot president of the English Benedictines, and president of the International Commission for the revision of the Vulgate, in virtue of which he was created Cardinal-deacon by Pius X. in 1914. On the occasion of his sacerdotal jubilee Pius XI. raised him to the dignity of Cardinal-priest. He was the leading authority on pre-Reformation monasticism in England; *d.* at Rome April 5th. His works include: *Henry VIII. and the English*



CARDINAL GASQUET

Monasteries, 1888-89; A Short History of the Catholic Church in England, 1903; English Monastic Life, 1903; Vita Antiquissima B. Gregorii Magni, 1903; Henry III. and the Church, 1905; Collectio Anglo-Premonstratensis, 1906 (vol. i. had been previously published in 1904); *Parish Life in Medieval England, 1906; The Greater Abbeys of England, 1908; Monastic Life in the Middle Ages, 1922; His Holiness, Pope Pius XI., 1922.* Edited Montalembert's *Monks of the West* (6 vols.).

Gassendi (or **Gassend**), **Pierre** (1592-1655), a French philosopher and mathematician, *b.* in Provence. He studied at Aix with a view to entering the Church, but abandoned the idea and took up the study of philosophy. He made an examination of the Aristotelian systems, and published, in 1624, *Exercitationes Paradoxicæ Adversus Aristoteleos*, in which he protests against the acceptance of the dicta of Aristotle as final in all matters of philosophy. In 1645 he was made professor of mathematics at the College Royal in Paris. While in Paris he wrote *De Vita*

Epicuri, a commentary on Diogenes Laertius' tenth book, and *Synlogma Philosophicæ Epicuræ*, which contains a complete sketch of the system of Epicurus. G. was a disciple of Bacon and on friendly terms with Galileo, keeping pace with the moderns in natural and physical science just as he referred to the ancients. His *Institutio Astronomica* is a book on the science of his own day, while *Tychonis Brahe, Nicolai Copernici, Georgii Fuerbachii et Joannis Regiomontani Vita* contains a complete history of astronomy down to his own time.

Gasset, Jose Ortega y, b. in 1883 and for some years professor of the University of Madrid. Like so many of his university and literary contemporaries, he is considered to be one of the true inspirers of the Spanish revolution which came to a head in 1931. For long regarded as a mere amused, but critical and learned spectator of life. Indeed, six volumes of his collected essays bear the title *The Spectator*. But his more educated countrymen were made conscious of what was going on in the great world through his review *La Revista de Occidente*, and, in other works, he showed himself to be a sharp critic of the monarchical government and of the dictatorship in Spain. The best known of these books are *Meditations of Quixote* (1911) and *Invertebrate Spain*.

Gastein, situated in the duchy of Salzburg, Austria. Its two principal villages are Hof-Gastein and Wildbad-Gastein. Hof-Gastein is the capital of the valley and also a watering-place. Wildbad-Gastein is noted for its thermal springs. Pop. of whole valley, 4400.

Gaster, Moses, Rumanian philologist and Hebrew scholar, *b.* at Bucharest, Sept. 16, 1856; son of Chevalier A. E. Gaster; educated at Bucharest University. Lecturer of Rumanian language and literature at that university 1881-85, but exiled from Rumania for agitating on behalf of the persecuted Jews. In 1886 and 1891 he was Ilchester lecturer at Oxford on Slavonic and Byzantine literature; and he was in 1887 appointed chief rabbi of the Sephardic communities of England—a position he still holds; and he has been three times vice-president of the English Zionist Federation. His works include: *History of Rumanian Popular Literature, 1883; Rumanian Translation of the Hebrew Prayer-Book, 1883; Greeko-Slavonic Literature, 1887; Report on the English Educational Systems*, published as a Blue-Book by the Rumanian government, 1892; *The Hebrew*

Version of Secretum Secretorum of Aristotle, 1908; *The Samaritan Book of Joshua*, 1908; *The Jewish Divorce*, 1911; *Rumanian Bird and Beast Stories*, 1915; *Rumanian Fairy Tales*, 1923; *Exempla of the Rabbis*, 1924; *The Samaritans*, 1925; besides contributions to many journals and reviews.

Gasteropoda (Gk. γαστήρ, stomach, and πούς, πούς, foot), the name given to one of the three large classes into which molluscs are divided and, as the name indicates, all its genera are characterised by the ventral position of the feet. Gasteropods are subdivided into Isopleura, symmetrical, and Anisopleura, unsymmetrical forms. The former contain the simplest and most primitive molluscs, such as *Chiton*; they are elongated in form, the mouth being at one end, and the anus at the other end of the body, the pedal and visceral nerve-cords run parallel to one another the whole length of the body; and the gills, kidneys, genital ducts, and circulatory organs are bilaterally symmetrical; *Neomenia* and *Proneomenia* are small flat forms whose shell consists only of minute plates and spines in the skin; *Chaetoderma* are more elongated and cylindrical, but their shells are also rudimentary; *Chiton* has eight dorsal shell-plates, fitted one behind the other. In the Anisopleura the head and foot are bilateral, but the visceral nerve-cord is twisted, bringing the gills, kidneys, and anus to the right side: the reproductive organ and genital duct are single. The free-swimming forms known as Heteropods sometimes acquire a superficial symmetry. The Streptoneura, or loop-nerved Anisopleura, include *Patella*, the limpet, *Littorina*, the whelk, *Purpura*, the dog-whelk, etc.; the Euthyneura, or straight-nerved, include the Opisthobranchs, *Aplysia*, *Bulla*, *Doris*, *Colis*, etc., and the Pulmonata, *Helix*, the snail, *Arion*, the black slug, etc. Gasteropods are voracious animals, being furnished with powerful rasping organs which enable them to prey on other marine molluscs, while the terrestrial forms, such as snails, work havoc among flowering plants and vegetables; many of them, whelks, etc., are used for human consumption and as bait. Fossil gasteropods occur in the Cambrian rocks, and many modern types have their origin in Cretaceous times.

Gaston de Foix, see FOIX and FOIX, GASTON.

Gastrectomy. This operation consists in 'cutting the stomach,' that is, removal of part of the stomach wall for the purpose of excising an ulcer. The operation of gastroenterostomy consists in making a passage from the

stomach to the small intestine—in fact, short-circuiting the bowel—so as to prevent the food passing over and stopping the healing of an ulcer of the stomach wall or upper part of the intestine. Gastrostomy consists in making a mouth to the stomach, and is an operation performed in order to prevent the food passing through the throat and gullet. Gastrotomy is a term incorrectly applied to laparotomy (cutting the abdomen), meaning an operation inside the abdomen.

Gastric Catarrh, a running or excess of moisture from the wall of the stomach. It is due to changes in the wall arising from the contents of the stomach, to injurious substances circulating in the blood, or to changes in the nerve supply. *Treatment*.—As G. C. is caused or maintained by the food supply, a restricted diet or entire abstinence from food is indicated. Discomfort may be prevented by sipping hot or cold water.

Gastric Juice, a colourless acid fluid, secreted by certain cells in the stomach, containing enzymes and hydrochloric acid in addition to small amounts of organic and inorganic materials. The principal enzyme, or ferment, present is pepsin, which is derived from a precursor, propepsin. The latter, on coming into contact with acid, is converted into the ferment which acts upon the protein of the food. Pepsin, therefore, can only act in acid solution, and both the ferment itself and the hydrochloric acid of the G. J. are secreted by special cells in the stomach. The amount of the secretion, and also its composition, are determined by the nature of the food. Pepsin acts on protein matter, converting it into soluble forms, albumoses and peptones, which are passed on to the intestine there to undergo further change. It is possible that another ferment, rennin, is also present in G. J.; this is, however, doubtful, as the clotting of milk may be due to the pepsin.

Gastritis, see STOMACH.

Gastrolobium, a genus of leguminous plants, contains over thirty species, all of which are evergreen scrubs found in W. Australia.

Gastronomy, the science of eating, is inseparable from its application and is therefore an art as well as a science. The first gastronomical experiments were probably purely accidental, but for over three thousand years deliberate experiments have been made. The earliest gastronomists discovered that cooked fish and meat were more appetizing than raw foods. More recent experiments have given us the *sauce*

tartare with the sole, mint sauce with lamb, and red currant jelly with game. In the experimental field, the Fr. have been the foremost gastronomists, and have discovered many attractive and unusual food combinations. Like most arts, that of G. has frequently been debased, for at many periods in history it has degenerated into gluttony. For the consumer, the best expression of the art is in the enjoyment of appetising dishes eaten with the fullness of appreciation that is accompanied by restraint. Modern G. as a science has to consider not only the combination of appropriate flavours, but also the food value of the dishes. This value is generally expressed in calories, the units of heat which may be supplied to the body by the food. It is estimated that a working man of average size needs from 2500 to 3000 calories per day, and tables have been prepared to show the numbers of calories to be obtained by given weights of various foods; for instance, a large egg yields about one hundred calories. Consequently, in the preparation of menus for the day's meals, the foods have to be selected to give sufficient but not too much heat energy, and then by means of subtle flavouring and exquisite cooking, the science and art of gastronomy are combined.

Gastrula, in zoology, an organism of which the stomachal cavity is the most prominent. From a physiological standpoint G. represents the simplest type with cellular differentiation. It appears in the development of almost all groups of the animal kingdom as a free swimming larva, and to which the adult sexually mature (Coelenterate) closely approximates. *Amphioxus* shows the development excellently. A hollow ball of cells (*blastosphere*) suffers invagination of one part of its wall upon another, yielding a thimble-shaped G. in which the external layer of cells (*ectoderm*) and the internal (*endoderm*) surround a central cavity (*arch-enteron*) which communicates with the exterior by means of the *blastopore* or the orifice produced by the narrowing of the aperture of invagination. Haeckel believed that in the G. he had found the stage common to the development of all multicellular organisms.

Gatacre, Sir William Forbes (1843-1906), a major-general, b. near Stirling. In 1898 he went to Egypt to command the British brigade in the advance up the Nile for the recovery of Khartoum, and took part in the operations which ended with the capture of Omdurman. In the S. African

War he made an attempt to seize the railway junction at Stormberg. The attempt was unsuccessful and G. was blamed by Lord Roberts for his want of judgment. In 1900 he failed to come to the assistance of the troops at Reddersburg and was recalled.

Gate and Gateway, a military term of the Middle Ages which was used technically to denote the huge barrier which defended the outer entrance to a castle or fort. It was usually made of solid oak, and was swung by means of huge hinges inside an arched 'gateway.' Above the gateway was perforated stonework, through which might be dropped boiling pitch and molten lead on to the heads of the besiegers. The gateway was further defended by a portcullis which often stood down even when the gate was opened. Towers from which a flanking fire could be brought to bear on the attacking party also formed a further protection. The gateway usually stood on the brink of the moat and was still further protected by a drawbridge.

Gates, Horatio (1728-1806), an American general, b. at Maldon in Essex, England. He took part under Braddock in the expedition to Fort Duquesne, which ended in disaster (1755). He escaped with difficulty and settled down in America. On the outbreak of the War of Independence, he sided with the colonists and quickly made a name for himself. He obtained the northern command and forced the surrender of a British army at Saratoga (1779). He now aimed at the command-in-chiefship of the American army. In 1780 he was badly defeated at Camden by Cornwallis, and as a result of a court-martial was superseded. He finally retired to Virginia, and thence to New York, where he died.

Gateshead, a municipal co. and parl. bor. of Durham, England. It is situated on the opposite bank of the Tyne to Newcastle, a town with which it is very closely connected. It is reached and served by the London and North-Eastern Railway. The town is a typically busy town of the N. of England. It has no outstanding buildings of very high architectural beauty, but many of its churches are well built. The streets and general building of the town, however, are by no means very striking. The town has been very largely restored since the great fire of 1854 which destroyed a very large part of it. Education is well provided for; there are grammar, technical, and art schools. The river is bridged in three places, and con-

nection with Newcastle is thus established. The town has large iron works and foundries, shipbuilding yards, tanneries, and soap works. The town is also a great centre for the London and North-Eastern Railway, which has a depôt and a locomotive yard there. The streets are well supplied with an electric tramway service. The town returns one member to parliament, and its corporation consists of a mayor, nine aldermen, and twenty-seven councillors. The town is probably of Saxon origin, the first mention of it being made towards the end of the eleventh century. The town obtained a charter from the Bishop of Durham, the lord palatine, during the next century and then entered into a long contest with its rival, Newcastle. The great struggle between these towns rose from rivalry over fishing and trading rights. For a short time in the sixteenth century Newcastle and G. were united. The town remained at any rate under the nominal headship of the bishops of Durham until the end of the seventeenth century. The town was not given a member of parliament until 1832. Pop. 125,000.

Gath, one of the royal cities of the Philistines. It was situated near the borders of Judah, and is held to be the birthplace of Goliath. During the early years of the Latin kingdom of Jerusalem, it was fortified by the crusaders. It fell into the hands of Saladin in 1191, but was recaptured in the next year by Richard I. The exact site of the town is not now known, but Tell-es-Safiyeh is supposed to occupy most nearly the site of it.

Gatineau, a riv. of Canada, a trib. of the Ottawa, which has its source in some lakes, situated in about lat. 48° N., and long. 75° 30' W. The direction of its course is chiefly S.S.W., and it eventually enters the Ottawa, after flowing 400 m.

Gatling, Richard Jordan (1818-1903), the inventor of the Gatling gun, a species of machine gun. He was an American citizen and an inventor of some note. He turned his attention in many directions and patented a sowing machine (for seeds), and a steam plough. In 1861 he patented his gun, which was of great service during the American Civil War, but was greatly improved in 1865. By means of a revolving handle a constant rifle fire was kept up from 8 to 10 rifle barrels which revolved on an axis.

Gatty, Margaret, *see* EWING, JULIANA HORATIA.

Gatty, Nicholas Comyn (b. 1874), Eng. opera composer, b. at Bradfield,

Sheffield, and educated at Downing College, Cambridge. For some years was organist at the Duke of York's Military School, Chelsea. Musical critic to the now defunct *Pall Mall Gazette*, 1907-14. His opera *Grey-steel* was produced in Sheffield in 1906, and this was followed by *Duke or Devi* at Manchester in 1909. *The Tempest*, at the Surrey Theatre, London, in 1920, and *Prince Ferelon* (a Carnegie award) at the Old Vic in 1921. Other works: *Macbeth*, a tragic opera; and *Romance*, piano-forte waltzes.

Gau, *see* GA.

Gauchos, the name given to the inhabitants of the pampas of Argentina. They are chiefly of Spanish-American origin, but the strain is tinged with Indian blood. Their horsemanship is superb, and they are also exceedingly clever with the lasso. The habits of the people themselves are sordid. Gambling and profligacy are rife amongst the male portion of the inhabitants, whilst the women are treated very badly. They are, however, externally polite and hospitable.

Gaudeamus, a Ger. student song of very ancient origin. The name is derived from the first word of the song, 'Gaudeamus igitur, juvenes dum sumus' ('Let us then rejoice while we are young'). The song is extremely popular in the student world, not only in Germany, but in Scotland also.

Gauden, John (1605-62), the supposed author of the *Eikon Basilike*. He was b. at Mayfield, Essex, a place of which his father was vicar. He received his education at Bury St. Edmunds and later at St. John's College, Cambridge. He became chaplain to Robert Rich, Earl of Warwick, who was one of the parliamentary leaders. At first his sympathies were with the parliament, but the excesses of the advanced parliamentarians drove him to change his opinion. He became Bishop of Exeter after the Restoration, and later became Bishop of Worcester. His claims to the authorship of the work already quoted are not absolutely definite, but have much to be said for them. The authorship was, and still is, imputed to King Charles I.

Gaugamela, a vil. in Assyria, situated near the ancient site of Nineveh, and near the modern town of Mosul. The battle which is usually called Arbela was fought near here, and the town from which it receives its name is in reality some 40 m. further E. At this battle Alexander the Great defeated the Persians under Darius, 331 B.C.

Gauge, the term applied to the width of a railway track. The G. is

different in most countries, and depends upon the measurements adopted by the majority of the railways. The measurement is made from inside to inside of the head of the rails. The chief measurements for the principal countries of the world are: India, 1 metre, 3' 6" in parts of Australia, and S. Africa, Egypt, and the Sudan; 4' 8½" in Great Britain; 6 ft. in U.S.A. Tramway Gs. are usually 4' 8½".

Gauging, the art of measuring the amount of liquid in a receptacle, or the holding capacity of any vessel. In the wine, beer, and spirit trade special men are engaged to estimate the amount of stock in hand.

Gauguin, Paul (1848-1903), Fr. painter; b. June 7 in Paris; father Clovis Paul G. a journalist, mother a native of Peru. Brought up at Lima, and with a grandfather at Orleans. Followed a sea-life, 1865-71. Succeeded as a banker. Made acquaintance with Pissaro; joined Impressionist group. Became one of the first of the Post-Impressionists. Painted rocky Breton landscapes; painted under Van Gogh in S. France. In Tahiti, 1891-3, living with natives and painting studies of native life. Returned to Paris. Went back to Tahiti, 1895. Removed, 1901, to Dominiba, Marquesas Islands. Died there in poverty, May 9.

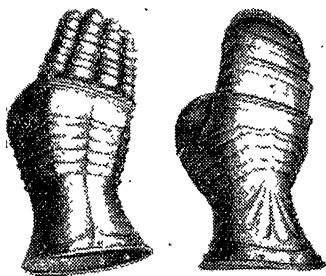
Gauhati or Gowhaty, tn. of Assam, standing on the Brahmaputra, 70 m. E. of Goalpara. It is the capital of the Kamrup dist., and the largest tn. in Assam, and, until superseded by Shillong in 1874, was the centre of British administration. It is still an important trading centre, and is remarkable for the number of ruined temples, etc., in its vicinity. The temple of Kamakhya is a Hindu place of pilgrimage. Pop. about 10,000.

Gaul, *see* FRANCE.

Gaul, Gilbert William (1855-1919), American painter; b. March 31, at Jersey City, N.J., son of George W. Gaul. Studied art under John G. Brown and L. E. Wilmarth, 1872-6. Associate, National Academy of Design, 1880; academician, 1882. Married in England, 1898. Painted: 'Indian Girl,' 1880; 'Old Beau,' 1881. Speciality, battle-pictures—especially scenes from Civil War: e.g., 'Charging the Battery,' 'News from Home,' 'Saving the Colors,' 'Cold Comfort on an Outpost,' 'Battery H in Action' (in the Toledo Museum), 'Silenced,' 'Exchange of Prisoners' (in Democratic Club, New York), 'On the Look-Out,' 'Guerillas returning from a Raid.' Later pictures: 'Golden Prospects,' 1910; 'Sioux Indian,' 'Loot,' 1911; 'Ration Day,' 'Peace Conference,' 1912. Died in New York, Dec. 21.

Gaunt, John of, *see* JOHN OF GAUNT.

Gauntlet (Fr. *gant*, a glove), was the name given to a steel glove forming part of the armour of knights. The back of the hand, on such gloves, was made of plates joined together in order to allow of the closing of the hand. The phrase 'to throw down the gauntlet' is a synonym for issuing a



GAUNTLETS

challenge. 'To run the gauntlet' is a punishment where the culprit runs between two rows of persons, each of whom strikes him as he passes. The use of the word G. here is due to a mistaken derivation from *gallope*—Swedish *gata*, street, and *lopt*, a course.

Gaur, a species of bison found in most of the regions of India and Burma. The hill tribes have succeeded to a slight degree in domesticating it, but, on the whole, it is much more frequently found in the wild state. It is almost black in colour, and has a high convex ridge between the horns. The ears are large, but the animal has no dewlap. Often the bull attains a height at the withers of 6 ft., but the back slopes very much, so that it is much lower at the loins. The animal is very shy and is usually found in large herds.

Gaur, an ancient city of Bengal now in ruins. It is situated on the R. Bhagirathi. From 1100 until the decline of the Mohammedan power it was the residence of the viceroys and kings of Bengal. It is about 70 m. E.S.E. of Bhagalpur. *See* Ravenshaw, *Gaur: its Ruins and Inscriptions*, 1878.

Gauss, Carl Friedrich (1777-1855), a Ger. mathematician. He was b. of humble parentage at Brunswick and quickly attracted attention by his ability. In 1801 he published *Disquisitiones Arithmeticae*. Six years later he became director of the Göttingen observatory, an office which he retained until his death. His work gave great impetus to astronomical observation, and he did much

work on the theory of magnetism. He erected an observatory free from iron from which he continued his researches on the subject of the magnetism of the earth. He founded the Magnetic Association. His research on the subject of magnetism had world-wide effects. Between the years 1863-71 his works were published in 7 vols.

Gautama, see **BUDDHA** AND **BUDDHISM**.

Gautier, **Théophile** (1811-72), a French poet, critic, and novelist, one of the most famous personalities of the nineteenth century. He was b. at Tarbes, but came to Paris while still a child and was educated at the Lycée Louis-le-Grand, and at the Collège Charlemagne. With the intention of becoming a painter, he entered de Rioult's studio, where he remained two years. But he was a great lover of poetry and Sainte-Beuve had just made known to the modern world the romantic writers of the sixteenth century—the poets of the *Pléiade*. The reading of these and of the writers of the new romantic school, especially Victor Hugo, raised G.'s enthusiasm to a high pitch. Pétrus Borel, struck with some verses he had written, introduced him to Victor Hugo, who found in G. something more than discipleship—a fervent fanaticism. Sainte-Beuve, too, was astonished by the work of this young writer, not yet eighteen, who already showed an almost unsurpassable gift of style, drawn very evidently from Marot, Ronsard, du Bellay, etc., whose tradition, abandoned by Malherbe and those who followed, he now, with the new poetic school, determined to carry triumphantly forward. He threw himself with extravagant fervour into the movement and became an extreme opponent of the classic school. His defiance of conventionality led him even into grotesqueness of personal appearance—a cherry-coloured waistcoat, green trousers, grey overcoat lined with green satin, a luxuriant forest of black hair—this was the 'get-up' which he triumphantly describes as 'pas mal combiné pour irriter et scandaliser les philistins.' And indeed, 'shocking the philistines' became one of his prime motives, to the detriment, later, of some of his work. He became one of a band of 'brigands de la pensée' calling itself 'Jeune-France.' In 1830 he produced his first long poem, *Albertus*, an extravagant theological legend remarkable for its perfection of style, its colour and imagery. Then followed *Comédie de la Mort*, *Les Jeune-France*, an attack upon the 'false romantics,' and *Mlle. de Maupin*

(1833), a novel which shocked public opinion by the contempt for morality displayed therein. At this point G. became a journalist and for thirty years his chief work was that of art critic and *feuilletoniste*. In *Emcux et Camées* G.'s style reaches its climax of perfection; here is seen fully realised that 'science of form' which was his religion. In these exquisite little poems in verse of eight syllables the words have, what he held they should always have, like precious stones, a beauty and a value all their own. It might be said of him that he did not abandon the career of a painter, but that he merely changed his tools. 'Le style, c'est l'homme' is true of G., his subject interested him far less than the form in which he presented it. He was not inspired by great ideas, he was an artist with a supreme love of beauty and great power of humour, irony, and charm. His *Ménagerie Intime* is an informal biography, full of grace and lightness of touch, in which his favourite cats figure daintily. His other works include *Jettature*, *Une Larme au Diable*, *Le Capitaine Fracasse*, *Spirite*, *Fortuno*, *Tra los Montes* and other travels, *Histoire de l'Art Dramatique en France* (6 vols.), etc. His daughter, who became the wife of M. Catulle Mendès, writes novels in her name of 'Judith Gautier.'

Gauvain, **Auguste**, Fr. journalist and diplomat, b. Oct. 6, 1861, at Vesoul. Educated: Vesoul; Faculté de Droit, Paris. On *Journal des Débats*, 1889-92. In 1893, became general secretary to European Commission of the Danube. In 1904, appointed Fr. secretary to Central Office of International Transport at Berne. Returned 1908 to *Journal des Débats*, directs its foreign policy. Member of Academy of Moral and Political Sciences. Works include: *Les Origines de la Guerre européenne*, 1915; *L'Europe avant la Guerre*, 1917; *L'Afrique grecque*, 1917; *La Question yougo-slave*, 1918; *L'Encerclement de l'Allemagne*, 1919; *L'Europe au Jour le Jour*, 1917-23.

Gauze, a light transparent fabric, used for dress purposes. The name is thought to have been derived from the fact that Gaza, in Palestine, was the place of its origin. The warp threads of the material are crossed between each thread of the weft, which passes through a succession of loops in the warp. Thus the threads are kept apart, with no tendency to slide, and the transparent character of the fabric is maintained. Other materials have this gauze-like quality, such as muslin, etc. The manu. is most extensively carried on in France and Switzerland.

Gavarni, Paul (1801-66), a French caricaturist. His real name was Sulpice Guillaume Chevalier. He was *b.* at Paris and became a mechanical engineer, but he abandoned this profession and became caricaturist for *Les Gens du Monde* and *Le Charivari*. His work gradually assumed a more serious tone and there entered into his caricatures a slight bitterness. He visited London in 1849. He illustrated also a number of books published about this time, amongst which may be mentioned the works of Balzac, and the French translation of Hoffmann's tales.

Gavazzi, Alessandro (1809-89), *b.* at Bologna, and became a Barnabite monk. He became professor of rhetoric at Naples and allied himself with the Liberal policy of Pope Pius IX. He worked hard, with the papal sanction, amongst the people of Rome, and was appointed almoner-in-chief to the national army. After the fall of Rome G. separated from the Church of Rome, being after this date a strenuous advocate of the Italian Free Church (Protestant). He visited England and Scotland and lectured there, as he did also in U.S.A. and Canada, but his reception was the opposite of enthusiastic. He was associated with Garibaldi at Palermo.

Gavelkind. Tenure in G., which is only met with in Kent, is a species of socage tenure dating from the earliest days of the feudal system of land holdings. The distinguishing characteristic of lands held in G. is that they descend not to the eldest son, but to all the sons together (*see also* CO-PARENTERS, and *cf.* BOROUGH-ENGLISH).

Gaveston, Piers (*d.* 1312), Earl of Cornwall, son of a knight of Gascony, and the favourite of Edward II. He was the foster brother of Prince Edward, and held a great influence over the prince. His great influence over Edward when he became king was the cause of much trouble at home. He was on one occasion made regent of England, but was finally banished. His return was the signal for an outbreak on the part of the barons, and Piers Gaveston was captured and executed.

Gavotte, the name of a French dance, said to be derived from the Gavots, the inhabitants of the Pays de Gap. The music of the dance is in common time, beginning on the third beat of the bar. It is in two sections, each of which is repeated. The classical composers, often introduced Gs. into their suites.

Gawain (Welsh, *Gwalchmei*), one of the knights of the Round Table, nephew of King Arthur and son of Lot, King of Norway and the Orkneys.

About 1130 William of Malmesbury speaks of G.'s tomb in Wales and says he was king of Galloway. Then Geoffrey of Monmouth made his name famous, relating many of his exploits and the story of his death fighting for Arthur. He is here a most courteous and virtuous knight, and Wace, in his translations, carries on this tradition and says that 'his worth was greater than he took credit for, and that he performed more than he promised.' In Chrétien de Troye's continuation of the Anglo-Norman tales G. is still a model of all the knightly virtues, and he is the hero of a great part of *Perceval*. In the *Tristan and Lancelot* of a later period, the 'gay, gracious and gude' knight becomes cruel, treacherous, and light o' love. Malory, deriving his material from this source, and Tennyson, following Malory, present G. in this light. Some writers identify G. with the Irish hero Cuchullin (*q.v.*), and trace to Ireland this undeserved change of reputation, ascribing it to misconception arising out of the fact that G., whom tradition made to be a knight 'out of faërie,' as Chaucer puts it, was the champion of women and came from that part of the ancient Irish 'other world' called the 'Isle of Women.' *See The Legend of Sir Gawain*; Jessie L. Watson, *Sir Gawain and the Green Knight*, etc., vols. i., vi., and vii of the Arthurian Romances (Nutt).

Gay, John (1685-1732), an English poet, *b.* at Barnstaple and educated at the grammar school there. He was apprenticed to a silk mercer in London but, having a strong taste for poetry and no aptitude for business, he was soon set free. Little is known of his life until 1713, except that in 1708 he published his first poem, *Wine*. In 1713 he wrote *Rural Sports*, a georgic, which he dedicated to Pope, whose fame was by this time established. This brought him the patronage and life-long friendship of Pope, with introduction into the company of wits associated with him, Arbuthnot, Swift, Bolingbroke, and Congreve. These friendships stood him in good stead ever after; all loved and helped the happy, simple-hearted, improvident 'good fellow' and mediocre poet who was always suffering from the 'large promise with performance scant' of aristocratic patrons. In 1713 also he published *The Shepherd's Week*, a series of pastorals written at Pope's request to satirise the pastorals of Ambrose Philips. From 1712-14 he was secretary to the Duchess of Monmouth. Later, he published *The Fan*, *Trivia*, written with Swift's help; *The Wife of Bath*, an unsuccessful comedy; *What d'ye Call It?* a dramatic skit;

and *Three Hours after Marriage*, a play which was hissed. His *Fables* are his best work; they are little masterpieces of their kind. But the work which made him famous was a lyrical drama, *The Beggar's Opera*, first produced by Rich in London and afterwards performed throughout the British Isles, making 'Gay rich and Rich gay.' (See also LYRIC THEATRE.) It is a satire on the corruptions of society. *Polly*, its sequel, was prohibited. Gay wrote several ballads; two of the best known are *Black-eyed Susan*, and *'Twas when the Seas were Roaring*. He lost all his money and spent the later years of his life in the home of the Duke and Duchess of Queensberry. He was buried in Westminster Abbey.

Gaya, a dist. and city of British India in the Presidency of Bengal, and the Patna division. The city is 87 m. S. of Patna, and contains a high school, hospital, and printing presses. Pop. 70,000. The dist. is 4712 sq. m. in area. Opium is the chief crop; mica mines are worked in the S.W. Other industries are the manufacture of brass utensils and black stone ware, the weaving of carpets and blankets and the production of shellac. The Grand Trunk Road traverses the S. and branches of the East Indian Railway run to G. Pop. 2,225,000.

Gayal, or *Bos frontalis*, a species of ox found in the highland regions of N.E. India. The animal is often found wild, but just as frequently in a



GAYAL

semi-domesticated condition. Compared with the gaur it is a smaller animal, and its horns are much straighter. The forehead has no frontal crest. The gayal and the gaur frequently interbreed.

Gay-Lussac, Joseph Louis (1778-1850), a French chemist and physicist, was b. at St. Léonard, Haute Vienne. In 1797 he entered the Ecole Polytechnique, where he met Berthol-

let, who appointed him demonstrator to his class and assistant in the government works at Arcueil. In 1809 he was elected professor of chemistry at the Ecole Polytechnique. In 1832 he was chosen professor of general chemistry at the Jardin des Plantes, Paris. He is famous for his chemical and physical investigations. In 1804 he made a balloon ascent with Biot to ascertain whether the terrestrial magnetism ceased out of contact with the earth. In a second ascent he observed the regular decrease of pressure, temperature and moisture in the air. He also affirmed that the air has the same composition at the greatest height as at the surface of the earth. In 1804 and 1805 he made experiments with Humboldt and discovered that water is composed of oxygen and hydrogen in the ratio 1:2. He also made a study of other gases and published in 1808 his *Law of Volumes*. In 1811 with Thénard he discovered that potassium could be obtained by a purely chemical process. In 1813 he published some valuable information about iodine. In 1824 he discovered and investigated fulminic acid, and also experimented in fermentation. He is also famous for his experiments regarding the manufacture of sulphuric acid, glass, and chloride of lime. Two of his most important works are: *Mémoires sur l'Analyse de l'Air Atmosphérique*; *Cours de Physique*.

Gaza, now called Guzzeh, was the most southerly of the five chief cities of the ancient Palestine. Situated about 3 m. from the sea, where the trade routes from Egypt and Petra met, G. was always an important fortress and trading town. The Tell-el-Amarna tablets mention it for the first time, and in Biblical times it was the scene of many struggles between the Israelites and the Philistines. Under Rom. rule, G. was prosperous, but its power declined in later years, until it was of no account in the fourteenth century. In the sixteenth century the Mamelukes were finally defeated here by the Turks, and in 1799 it was taken by Bonaparte. Of late years the cultivation of barley has caused a partial return of prosperity. It was made an episcopal see by Constantine the Great, and has a mission with schools of the C.M.S., including a hospital. Recent (1930-31) researches by the British School of Egyptian Archaeology establish that the obvious site of G. would be at the mouth of the Wady Ghuzzeh, the estuary of which river is too malarial for permanent occupation. This site, the site of Tell-el-Ajjul, is practicable only in the rainy season, beginning January, and,

according to Flinders Petrie, was occupied from the Neolithic to the Bronze Age, and appears to have been the old Gaza. After the age of the Shepherd Kings, it was evidently abandoned like Ostia and the Gk. cities of South Italy. The pop. now less than 16,000, decreased rapidly after the Great War.

Gaza, Theodorus (1398-1478), Gk. teacher, *b.* at Thessalonica. About the year 1440 he left Greece and went to Italy, in which country he received the appointment of teacher of Gk. at Ferrara, and afterwards to Rome in the time of Pope Nicholas V., and was made professor of philosophy there. In 1455 at the invitation of King Alfonso he visited Naples, where he remained about three years, and on returning to Rome was given a benefice in Calabria by Cardinal Bessarion. His most important work is one on Gk. grammar, published in 1495, and he has also translated Aristotle, Saint Chrysostom, Theophrastus, and other writers.

Gazelle, or Gazella, a genus of antelopes, the majority of which are inhabitants of the deserts of the Old World. They have narrow upper molar teeth, like sheep, and their muzzles are covered with hair. There is frequently a gland below the eye, and the tail is rather short. The horns are generally compressed and lyrate or recurved, or cylindrical and spiral with distinct rings for a considerable portion of their length. The Gs. are amongst the most elegant of all antelopes, and are characterised by their sandy colour and a white streak on the side of the face from the base of the horn nearly to the nose. The genus is represented in S. Africa by the springbok.

Gazetteer. In modern English, this term signifies an alphabetical arrangement of place-names, in other words, a geographical and topographical dictionary containing more or less abundant information, comprising statistics, descriptions, and historical details. In the eighteenth century, the word was used in the sense of a writer in the gazettes or newspapers (*Fr. gazétier*), and in 1703 the *Gazetteer's or Newsman's Interpreter* was published by Lawrence Echard, followed in 1704 by a second part, called *The Gazetteer*. Although expressed by a new word, the idea was of ancient date, and considerable fragments of the sixth-century geographical dictionary of Stephanus Byzantius remain to this day. Echard's method was soon adopted by other compilers, viz. Bryce, who published his *Grand Gazetteer* in 1759; and Crutwell, with his *Universal Gazetteer* in 1808. More modern works have now superseded

these, including: Longman's (*Times*), Blackie, Chambers, Lippincot, Jack, Oliver & Boyd, etc., etc. Foreign general Gs. are represented by Ritter's *Geog. Statist. Lexikon* (1898), and *Le Nouveau Dictionnaire de Géographie Universelle* of Vivien de St. Martin. Cassell & Mackenzie (1893) for Great Britain; Lewis, Wilson & Brabner for England and Wales; F. H. Groome for Scotland; and Lewis & Leggatt for Ireland, come under the heading of special Gs. Among foreign Gs. may be mentioned Neumann for Germany; Hunter for India; Alta-villa for Italy; Semenoff for Russia; Rosenberg for Sweden, and Weber for Switzerland, as also a series of departmental Gs. for France. In India alone the government have borne the cost of the compilation of numerous Gs. for the different states; but some of them are very hard to obtain, unfortunately. However, Hunter's *Imperial Gazetteer of India* is on a magnificent scale, and remarkable for its accuracy. The individual states of the American Union also have special Gs.

Gearing refers to the apparatus which communicates the energy from one part of a machine to another. It may consist of toothed wheels, endless bands, or of friction rollers, etc. A description of the various Gs. used will be found under the articles dealing with the various types of machinery. The relative velocity of wheels in gear is proportional to their diameters. Thus, if two wheels with diameters of 60 and 20 in. respectively be geared up, then the relative velocity of the latter to the former will be as 3 is to 1. Expressed as a formula we might put it, that if N and N_1 represent the number of turns in a given time, and D and D_1 the diameters of the wheels making

the revolutions, then $\frac{N_1}{N} = \frac{D}{D_1}$. The

number of wheels geared up together may, of course, be more than two; in which case the relative velocity is always considered as between the first and the last wheel in the series. The direction of motion of the last wheel will also obviously depend on the number of wheels in the system. *Straight gearing*, by means of *spur wheels*, generally, is used when the planes of motion are parallel. When the planes intersect, then *bevelled gearing* by the aid of *bevel wheels* must be used. Further, if the planes neither intersect nor run parallel, i.e. are skew planes, then *skew bevel wheels* must be used, giving, of course, a *skew bevelled gearing*. The shape of the teeth on any wheel must be such that the friction caused by them,

when in gear with another wheel, shall be as small as possible. The teeth are spaced, naturally, at equal distances apart, and this distance is known as the *pitch*. The pitch can be found by multiplying the diameter by π (roughly 3.1416 or $\frac{22}{7}$) and dividing by the number of teeth. Thus, Pitch = $\frac{\text{Diameter}}{\text{Teeth}} \times \frac{22}{7}$. The

teeth of a wheel may be made in any curve provided that the perpendicular common to the outlines of the teeth in contact passes through the point where the pitch circles touch. Among other types of G. that may be mentioned are: *Helical gearing*, in which the pitch surfaces are cylindrical or conical, and the teeth intersect the surface in helical lines. This is a modification of tooth G., which enables the wheels to work more smoothly than in the ordinary G. and greatly strengthens the teeth. For speed reducing, *screw and worm gearing* may be used. In this the teeth of the wheel consist of portions of many screw threads. The worm which drives the wheel usually consists of from one to three complete threads. Thus, for each revolution of a worm which has only one thread, the wheel would move just one tooth forward. So if the wheel had 100 teeth, then the worm would revolve 100 times to drive the wheel round once. A special form of G., known as Houldsworth's *differential gearing*, is used in spinning machinery for regulating the speed of bobbins. In reality it is only a special modification of *bevelled gearing*, consisting as it does of four equal bevel wheels mounted on axes to fit into each other. By an ingenious keying arrangement, as the bobbins fill with thread the speed diminishes, so preserving a constant tension on the thread. *Friction gearing*, used in lifts and other places where a rapid connection is necessary, consists of rollers or wheels which are pressed together in the direction of the line joining their centres. Where a constant velocity ratio is desirable and when the pressure transmitted is great, *pitch chain gearing* is used. This consists of a chain running in projections on *sprocket wheels*. To minimise friction the pins forming the links are provided with rollers. Various modifications of these rollers have been devised, among which may be mentioned the various Reynold chains. Toothed wheels are usually made of brass, cast steel, or cast iron, although sometimes in high speed G. raw hide teeth are used, and occasionally wooden teeth

are employed. The rollers in frictional G., on the other hand, although sometimes made of iron, usually have at least one with an acting surface of wood, leather, or compressed paper. See Unwin, *Elements of Machine Design*; MacCord, *Kinematics*; Kennedy, *Mechanics of Machinery*. See also MOTOR CARS, MACHINERY, etc.

Geber, or **Gebir**, the supposed author of certain works on alchemy and chemistry which are written in Arabic or Latin. So little is known of him that his existence has been doubted. He has frequently been identified with Jabir ibn Hayyan, a famous Arabic alchemist who lived at Kufa and Baghdad in the eighth or ninth century. His birthplace has been given variously as Kufa, Tarsus, and Harran in Mesopotamia, and some have asserted his death to have taken place in 776. But the Latin writings from internal evidence appear to have been written in the early part of the thirteenth century, and it has therefore been denied that a man of the name of G. ever lived. It is presumed that they were written by various hands. The chief writings which go under this name are *Summa Perfectionis*, *Summa Collectionis Complementi Secretorum Naturae*, and *Liber Investigationis*, which were translated into English by Russell in 1678. Recent researches on the subject have led to the conclusion that the Arabic works ascribed to Jabir ibn Hayyan must have been written about a century after the time of their supposed author. They are intimately connected with the doctrines of the Isma'ili sect. The Latin works are noteworthy as the clearest and most important of mediæval chemical treatises. See E. J. Holmyard, *The Arabic Works of Jabir ibn Hayyan*, Paris, 1923; E. Darmstaedter, *Die Alchemie des Gebers*, 1922; Bugge, *Das Buch der Grossen Chemiker*, Bd. I., 1929; P. Kraus, *Studien zu Jabir ibn Hayyan* (*Isis*, vol. xv., p. 7, 1931).

Gebhardi, Johann Ludwig Levin (1699–1764), a German author, b. at Brunswick. His most important publication is *Der Europäischen Kayser- und Königlicher Häuser . . . historische und genealogische Erläuterung vollständig ausgeführt*, 1730–1. He also wrote *Reques Francorum Merovingici documentorum autoritate asserti*, 1736, and other works of a similar character.

Gebweiler, a tn. of Upper Alsace, at the mouth of the Blumenthal, at the E. foot of the Vosges. It has a twelfth-century church in the Transitional style, and a fourteenth-century Dominican church. Its manufactures

include soap, brick, cotton, and woollen goods and machinery. Pop. 11,369.

Gecko, the name given to all lizards belonging to the family Geckotidae of the order Lacertilia; they are small in size, dull in colour, and the soft skin is covered with granular tubercles. Most of them have adhesive digits, which enable them to run along smooth, horizontal or vertical surfaces with astonishing rapidity. Gs. are found in nearly all hot climates, and in Egypt and India frequently enter houses; their name indicates the sound emitted by certain species. *Phyllodactylus* is the most widely-distributed genus; *P. mauritanicus* being found in S. Europe; the individuals of *Ptychozoon* are remarkable for the web-like expansions which serve them as parachutes.



GECKO

Platydyctylus fascicularis

Ged, William (1690-1749), an inventor of stereotyping, b. at Edinburgh. He patented his invention in 1725, when he entered upon a partnership with a London stationer, Jenner, and a typefounder, James. He stereotyped two prayer books for the Cambridge University (1731) and an edition of Sallust (1744), but his enterprise was by no means successful financially. Consult a *Narrative* by his daughter and a *Life* by Nichols (1781).

Geddes, Rt. Hon. Sir Auckland C. (b. 1879), son of Auckland Campbell of Edinburgh. British professor of anatomy and politician. His reputation rests on his organisation, during the Great War, of a scheme of national service. In the S. African War he was a doctor of the R.A.M.C. Professor of Anatomy at McGill University, Montreal,

prior to the beginning of the Great War. Always keenly interested in military training, he was a volunteer of the Edinburgh University Corps and founder of the McGill University O.T.C. When the Great War broke out he joined the Forces as a major in the Northumberland Fusiliers, rising to the rank of brigadier-general. In 1916 he was appointed Director of Recruiting, in 1917 Chief of the National Service Ministry, and in 1918 President of the Board of Trade.

Geddes, Rt. Hon. Sir Eric Campbell, British man of business, prominent in Great War and immediately afterwards, b. Sept. 26, 1875, in India; elder brother of Sir Auckland G. Educated: Oxford Military College; Merchiston Castle School, Edinburgh. Intended for army; but at seventeen went to America for engineering experience. Worked at lumbering in S. States; four years with Homestead Steel Works and Baltimore and Ohio Railroad. Spent

six years in India, building and operating on Rohilkand and Kumaon Rly. Called to England by North-Eastern Railway Co. in 1903, and was general manager of their system from 1906. On outbreak of war in 1914 he came under notice of Lord Kitchener in connection with rail-transport of troops. Kitchener retained him in war dept. to superintend transport of munitions; and under Lloyd George he was Deputy-Director-General of munitions supply 1915-6. After battle of Somme he went to France to assist in re-organisation of Fr. railways; and he remained there as Director-General of Transport. In 1917 he was transferred to Admiralty as Controller of Shipping, and in July he succeeded Sir Edward Carson as First Lord of the Admiralty. He was made P.C., K.C.B., and

G.B.E., same year; and he became M.P. for Cambridge borough. In Jan. 1919 he was selected to fill the new position of Minister of Transport; and he joined the Cabinet and became G.C.B. Resigned in Oct. Chairman, Aug. 1921 till March 1922, of Committee on Public Economics, popularly known as the Geddes Axe. Left parliament in 1922, and became chairman of Dunlop Rubber Co. and of Imperial Airways, Ltd.

Geddes, Patrick, British scientist and sociologist, b. 1854; youngest son of Capt. Alex. G. Educated at the universities of London, Paris, Edinburgh, and Montpellier; and was formerly professor of botany at University College, Dundee. He has written many important articles on biological and sociological subjects (including *City Development*), and with Professor Sir J. Arthur Thomson, *Evolution of Sex*. He is greatly interested in town-planning, is associated with the Carnegie Dunfermline Trust, and is on the council of the Sociological Society. He was first warden of the University Hall of Residence (Crosby Hall), Chelsea, S.W. Wrote *The Life and Work of Sir Jagadis C. Bose*, F.R.S., 1920.

Geelong, a tn. in Grant co., Victoria, Australia, on an arm of Corio Bay, near the head of G. harbour. This has been deepened and improved by dredging and the construction of jetties; the largest wool ships are now able to load at its wharves which are connected by rail with all parts of the state. A large wool-broking trade has in consequence grown up of late. It is situated amid beautiful country, the soil is very fertile and the climate healthy. The gold mines were opened in 1851, and have added considerably to the prosperity of the town. There are good fisheries; woollen materials, rope, and paper are manufactured, and there are tanning and meat preserving works. Limestone and marble are found in the vicinity. Pop. (with suburbs) 38,000.

Geestemünde, see WESERMÜNDE.

Gefle, a seaport of Sweden in the prov. of Gefleborg, on the Gulf of Bothnia at the mouth of the Gefle R., 93 m. N.W. of Stockholm. The town is situated on two islands as well as on the river banks. It has a good harbour; there is an old castle and a fine town hall. The chief exports are iron goods, joinery, timber, and wood-pulp. It has shipbuilding yards and factories of machinery, tobacco, and cloth. Pop. 39,000. The province or *län* has an area of 7600 sq. m. Pop. (1921) 270,960.

Gegenbaur, Karl (1826-1903), a German comparative anatomist, b.

at Würzburg, where he was educated. In 1855 he was appointed professor of zoology and comparative anatomy at Jena, but after three years lecturing confined himself to the latter subject. From 1873 to 1901 he held a similar post at Heidelberg. He made his reputation chiefly on *Grundriss vergleichenden Anatomie*, 1874 (translated into English by Bell and Lankester, 1878). His publications include *Lehrbuch der Anatomie des Menschen*, 1883 (7th edition, 1892); *Vergleichende Anatomie der Wirbeltiere*, 1898-1901; and *Erlebtes und Erstrebtes*, 1902. He edited the *Morphologisches Jahrbuch* from 1875.

Gehenna (Heb. *Ge Hinnom*, Valley of Hinnom), a word used by the later Jews to designate a place of torment for the wicked after death. The Valley of Hinnom is a deep, narrow gorge, a few miles S.W. of Jerusalem, where some of the later kings of Judah practised the 'Abomination of the heathen' (cf. 2 Kings xvi. and xxiii.; Jeremiah vii.). When King Josiah re-established the national worship of Jehovah, it became the cesspool of Jerusalem, where the bodies of criminals were burnt. Hence it came to be used as a symbol for hell. In the New Testament there is a clearly marked distinction between the state of the dead (Revised Version, 'Hades') and the place of punishment (Revised Version, 'Gehenna').

Geibel, Emanuel von (1815-84), a German poet, b. at Lübeck. He graduated at Bonn (1836), travelled considerably in the Grecian Archipelago, and lived a quiet and studious life among literary friends in various German towns. In 1843 he received a royal pension, and in 1852 was appointed professor of aesthetics at Munich by Maximilian II. of Bavaria. G. composed two tragedies, *Brune-hild*, 1858, and *Sophonisbe*, 1868, and a comedy, *Meister Andrea*, 1865. His fame rests chiefly in his lyric poems, which won him great popularity. These include: *Gedichte*, 1840; *Junius-lieder*, 1848; *Neue Gedichte*, 1856; *Spätherbsblätter*, 1877; and *Gedichte aus dem Nachlass* (published posthumously), 1896. He translated poems from Spanish and French classics, in collaboration with Ernst Curtius, Paul Heyse, and others, and also wrote translations from the Greek and Latin poets. An edition of his collected works appeared in eight volumes in 1884. His biography has been written by Goedekes, 1869; Litzmann, 1887; Leimbach, 1894; and Gaedertz, 1897. Consult also Fredels, *E. Geibel und die Französische Lyrik*, 1905; and Pompecki, *Heine und Geibel*, 1901.

Geiger, Abraham (1810-74), a Jewish scholar, *b.* at Frankfort-on-Main. He was taught by his father and elder brother, and afterwards studied at the universities of Heidelberg and Bonn. In 1832 he became a rabbi at Wiesbaden, where he remained for six years; he subsequently officiated as rabbi at Breslau (1838-63), Frankfort (1863-70), and Berlin (1870-4). He was an enthusiastic student of Jewish theology, and assisted in starting the *Zeitschrift für Jüdische Theologie*, and from 1862 till his death he edited the *Jüdische Zeitschrift*. His publications include: *Urschrift und Uebersetzungen der Bibel*, 1857; *Sadduzäer und Pharisäer*, 1863; and *Das Judentum und seine Geschichte*, 1864-71. Consult his Life by Schreiber, 1880.

Geijer, Erik Gustaf (1783-1847), a Swedish historian, *b.* at Ransäter, in Vermland. He was educated at the university of Upsala, where, in 1815, he was elected assistant professor of history, two years later being appointed to the chair of Swedish history. He was one of the founders of the Gothic Society (1816), was appointed a member of the Academy (1824), and in his later years took an active interest in politics. His poetical works were of a high order and include: *Sista Skalden*, *Vikingen*, *Skaldestycken*, *Odalbonden*, etc. His chief historical works are: *Svea Rikes Häfder*, 1825, intended to be a complete history of Sweden from the earliest mythical times, but of which only the introductory volume was completed; and *Svenska Folkets Historia* (3 vols.), 1832-6, a history of Sweden down to the abdication of Queen Christina in 1654. He edited the papers of Gustavus III., which he left to the university of Upsala. His collected works were published in ten volumes (1873-7) with a biographical sketch. Consult his Life by Malmström, 1848; Carlson, 1870; and Neilsen, 1902.

Geikie, Sir Archibald (1835-1924), a Scottish geologist, *b.* at Edinburgh, where he was educated at the High School and University. In 1855 he received an appointment on the Geological Survey, and in 1867 became director of the Geological Survey for Scotland. After having lectured in geology at the Edinburgh University 1870 to 1881, he was appointed director general of the Geological Survey of the United Kingdom and head of the department of Practical Geology in the London Museum. He was knighted in 1891. His chief publications are: *The Story of a Boulder*, 1858; *Scenery of Scotland*, 1865 (3rd ed. 1901); *Memoir of Sir R. Murchison*, 1875; *Text-book*

of Geology, 1882 (4th ed. 1903); *The Ancient Volcanoes of Great Britain*, 1897; *The Founders of Geology*, 1897; and *Scottish Reminiscences*, 1904.

Geikie, James (1839-1915), a Scottish geologist, brother of Sir Archibald G., also *b.* and educated in Edinburgh. He served on the Geological Survey of Scotland from 1861 to 1882, when he succeeded his brother as Murchison professor of geology at Edinburgh. His writings include: *The Great Ice Age in its Relation to the Antiquity of Man*, 1874; *Historical Geology*, 1875; *Prehistoric Europe*, 1881; *Outlines of Geology*, 1886 (4th ed. 1903); and *Structural and Field Geology*, 1905.

Geiler von Kaisersberg, Johannes (1445-1510), a German preacher, *b.* at Schaffhausen, and studied at Freiburg, and Basel. He was a great pulpit orator and preached in the Strassburg Cathedral from 1478 till his death. His chief writings are: *Das Narrenschiff*, 1511; *Das Irrig Schaf*, 1510; *Christliche Pilgerschaft zum Ewigen Vaterland*, 1512; and *Das Evangelienbuch*, 1515. An edition of his *Schriften* was published at Freiburg, 1877-83. Consult biographical studies by Dacheux, 1876, and Lindemann, 1877.

Geisha. A Japanese dancing or singing girl. The G. usually learns to dance when a child of about seven, and is contracted by her parents to a master or mistress for a period of three years; frequently poverty-stricken parents sell their children outright to the owners of 'geisha houses.' The G. is kindly treated and beautifully dressed by her patrons, who arrange for her public appearances at restaurants and tea-rooms and themselves receive the profits. The dancing is mainly posturing and is without rhythm. One or more of the Gs. depict a story in dance, while others play upon the *shamisen* and sing the theme of the story.

Geislingen, a tn of Württemberg, 17 m. N.W. of Ulm, with glass, iron and metal works, and wood and ivory carving. Pop. 14,000.

Gela, an ancient Gk. colony on the southern coast of Sicily, founded by Rhodians and Cretans in 960 B.C. It rapidly grew in importance, and in 582 founded the colony of Agrigentum. The colony became very prosperous during the rule of Cleander (505), and when his brother, Hippocrates, became tyrant, the whole of Eastern Sicily came under its sway. Under Gelon, Syracuse was taken. Æschylus was buried here in 456. The town was captured by the Carthaginians in 405, and was destroyed by Phalaris of Agrigentum in 280.

Gelasius I. (492-496), a pope, the successor of Felix III. He was a native of Africa, but the date of his birth is unknown. He was autocratic in his rule, sternly repressed Pelagianism, and removed the name of Acacius, Bishop of Constantinople, from the diptychs. He succeeded in driving out the Manichæans from Rome. On his death he was canonised, Nov. 18 being set aside in the calendar as St. G.'s Day. Several of his letters are extant, and also a treatise on the Eutychians and Nestorians, *De duabus in Christo naturis adversus Eutychen et Nestorium. Liber Sacramentorum, and Decretum Gelasii de libris recipiendis et non recipiendis* have erroneously been ascribed to him, though he may have written parts of the former.

Gelasius II. (1118-19), a pope, formerly John of Gaeta. He succeeded Pascal II., but shortly after his election he was expelled from Rome by the Emperor Henry V., who set up an anti-pope, Gregory VIII. (Burdinus), with the help of the Normans. G. returned to Rome in July 1118, but was soon compelled to withdraw to France, where he *d.* in the monastery at Cluny.

Gelatine, a substance derived from bone and cartilage by treatment with boiling water. It is allied to the proteins, and is yet different from them. It contains carbon, hydrogen, nitrogen, oxygen, and sulphur, is laevorotatory, precipitated from solution by tannic acid, and readily undergoes putrefaction. The most characteristic property of G. is that of dissolving in water at high temperatures and solidifying to a jelly on cooling. It is prepared mainly from bones, which are treated first to remove the fat, and then with hydrochloric acid to dissolve out mineral matter. The bones are then bleached with sulphur dioxide and finally extracted with water at a temperature of about 80° C. Impure G. is known as glue (*g.v.*), whilst the purest form is a fish-G. known as isinglass. G. is used for making soups and jellies, in photography, for making substitutes for leather and ivory, and in many other ways.

Gelderland, a prov. of the Netherlands, bounded on the S.E. by Prussian lands and on the N.W. by the Zuyder Zee, with an area of about 1960 sq. m. The chief rivers of this province are the Rhine, Yssel, Meuse, and Waal. The chief occupation of the people is agriculture, and in some parts the soil is fertile, producing wheat, fruit, and tobacco, while the manufacture of cotton goods and paper is also carried on. This province was originally part of the Holy

Roman Empire, but after many vicissitudes was at the beginning of the nineteenth century divided between Prussia and Holland. Pop. (1920) 729,688.

Gelimer, king of the Vandals (530-34), was the great-grandson of Genseric. He was successful in deposing Hilderic in 530 and in obtaining the throne for himself. He was, however, defeated in 533 at the battle of Carthage, and his kingdom overthrown, he himself retiring to Galatia.

Gellée, Claude, *see* CLAUDE LORRAINE.

Gellert, was Prince Llewellyn's dog, who was left one day in charge of the prince's child and was successful in killing a wolf who came to attack it. When Llewellyn returned and saw the blood he imagined that G. had slain his child, and immediately killed the dog. He then discovered his mistake when he found the child quite safe and lying under the cradle. A tomb stands to the dog's memory at Beddgelert near Snowdon. *See Gellert's Grave*, 1850(?), by the Hon. William Robert Spencer.

Gellert, Christian Fürchtegott (1715-69), a poet, *b.* at Hainichen in Saxony. In 1751 he became a professor at Leipzig, where he had been educated. His works are important as marking the dawn of a new era in German literature, as they broke away from the formalities of earlier writers and prepared the way for Goethe and Schiller. His writings, particularly his fables, were popular even outside his own country. He wrote: *Fabeln und Erzählungen*, 1748-51; *Tagebuch aus dem Jahre 1761* (1863).

Gellius, Aulus, a Latin writer who lived during the second century A.D. There is little definite knowledge of his life. He seems to have been born in Rome, and to have stayed for some time in Athens, and to have been engaged in the law for some time. His best-known work is *Noctes Attice*, written in a country house near Athens during the winter nights, and containing extracts from various writers on very varied subjects. The first edition appeared in 1469, and later ones are Eronovius, 1706; Hertz, 1903.

Gellivara, a tn. of Sweden, situated about 130 m. N.W. of Lulea, with which port it is connected by rail. There is also a railway line connecting G. with the Ofoten-Fjord, Norway. The iron-mines near this town are exceedingly productive, the output being considerably over 1,000,000 tons per year. Pop. about 12,500.

Gelnhausen, a tn. in the prov. of Hesse-Nassau, in Prussia. It stands on the Kinzig to the N.E. of Frank-

fort, and on an island in this river may be seen the ruins of a castle built in the twelfth century by Frederick Barbarossa. Pop. about 5000.

Gelon, a tyrant of Gela and Syracuse. He came of a noble family of Gela, of which city he became master in 491 B.C. as successor to Hippocrates. In 485 B.C. he became master of Syracuse and took with him to that city many of the inhabitants of Gela and Camarina. He refused help to the Greeks when Xerxes warred against them, and gained a victory over the Carthaginians at Himera in 480 B.C. He d. about 478 B.C. beloved by all his people.

Gelsenkirchen, a tn. in the prov. of Westphalia, Prussia, about 5 m. N.E. of Essen. It is a rising town owing to the discovery of coalfields in the neighbourhood. It is also engaged in iron manuf. Pop. 200,000.

Gem (Lat. *gemma*, 'a bud,' from the root *gen*, meaning 'to produce,' or precious stone). Strictly speaking, the word G. is applicable only to such hard and precious stones as have been worked by engraving; but this is in its narrowest sense, and the word is applied to precious stones that have been cut and polished as jewels, such as the diamond, emerald, ruby, sapphire, etc., and it is sometimes extended even to include the pearl. The stones of the G. engraver are almost entirely confined to the variously coloured and striped varieties of chalcedony quartz. The banded stone, usually known as onyx, is the chief material employed for cameo and seal engraving, and other stones, important from the G.-engraver's point of view, are jasper, agate, chalcedony, bloodstone, etc. The ancient Egyptians seem to have developed the art of G. engraving, and abundant remains of seals of high antiquity have come down to us. The scarabæus, or sacred beetle, was the form in which their early seals were cut, with the intaglio design engraved in a flat base; and the early Greeks and Etruscans followed this form.

An essential property of a G. stone is a high degree of hardness, so that it may stand the abrasion to which it is subjected at the hands of the jeweller in order to render it an article of personal decoration. The more precious stones, such as the diamond, ruby, emerald, etc., possess this quality, in particular the first named, which is the hardest G. in existence. These rare and more costly precious stones are seldom, if ever, treated by engraving; their high value resting on their brilliance of sparkle and colour and lustre. Most G.-stones are harder than quartz, though a few such as the opal, moonstone, and

turquoise are inferior to it in hardness; but the degree of hardness of a precious stone is soon ascertained by the lapidarist when cutting it.

Gravels and other deposits of a similar nature frequently contain gem-stones, where they occur as crystals, or fragments of crystals, which have been reduced in many instances to the form of pebbles. The great majority of precious stones occur in a crystallised form, which form, however, is soon destroyed in cutting. Amongst the few ornamental stones which occur without crystalline form may be mentioned opal, turquoise, and amber. Although some stones, notably diamonds, are valued for their lack of colour (diamonds of pure 'water'), in most this is the principal element of attraction, and the beauty of many Gs. depends entirely upon their colour, which, however, is often due to the presence of pigmentary matter, and is not an essential property of the mineral. Tourmalines and sapphires, for instance, are often part-coloured. The most common mineral pigments are probably compounds of iron, manganese, and copper.

Exposure to light causes some stones to change or even lose their colour altogether; certain kinds of turquoise and topaz are particularly liable to this. Artificial light also makes some stones appear to change colour, as typified in sapphires and amethysts, which frequently acquire an inky, murky tint when displayed in artificial light. A cut stone depends largely on the amount of light reflected from its facets for brilliance, the light being reflected back or refracted from the facets at the back. The highest refractive power of any gem-stone is possessed by the diamond. The peculiar lustre and fiery flashes exhibited by this stone are due to its high refractive index and dispersion.

Gem-stones present great variety in their chemical composition. The diamond is composed of one element only; ruby and sapphire are oxides; turquoise is a phosphate, and so on. In ancient times stones were held in esteem for their supposed medicinal and magical powers as much as for their beauty and rarity. For example, up to comparatively recent times the toadstone was worn for its occult power, and stones, such as jade, are often valued for a similar reason at the present day. Uncivilised peoples value small stones, especially those of a peculiar shape and colour, as amulets or charms. Many of the superstitions regarding stones have come down to us, and the belief in 'lucky' stones is prevalent even nowadays.

A considerable trade has been carried on in modern times in the

making of artificial Gs. for jewellery purposes, and paste copies of existing Gs. are manufactured with comparatively little difficulty. The most famous maker of paste was James Tassie, a Scotsman, who settled in London in the latter half of the eighteenth century, and was successful in copying over 15,000 of the most famous and artistic Gs. of both ancient and modern times. He also produced a series of portraits in cameo, which are in great request at the present day and command quite high prices. Imitation stones are chiefly produced from a heavy glass lead of high refractive powers, and they are easily coloured by the addition of various metallic oxides. Attempts to make diamonds artificially have been numerous within recent years, but with the sole exception of those of Henri Morissan, all have resulted in failure. The artificial diamonds manufactured have not been larger than microscopic specimens; but in lustre, crystalline form, density, and hardness they are identical with the natural stone. Artificially made but genuine rubies and sapphires have also been put on the market. They have been obtained by heating barium fluoride with alumina, in the presence of a trace of potassium bichromate in the case of rubies; and of cobalt oxide in that of sapphires. These synthetic gems are thus composed of the same elements as the natural rubies and sapphires, but experts in the trade can detect them readily by means of tests which would not occur to the layman, e.g. under a strong microscope round air-bubbles can be detected in the manufactured gems, while, when present in natural stones, they are irregular in shape. A great many of these gems are made to-day in France, Germany, and Czechoslovakia to meet the demand for less expensive jewellery. They were produced as early as 1904 by the Fr. chemist Verneuil in his laboratory. Artificial pearls are made by inserting an irritant in the oyster-shell, and thus 'blister pearls' are produced. The cutting and polishing of Gs. is a difficult and delicate operation, and one requiring much skill on the part of the worker, especially when dealing with large stones, which may possibly be of great value. Small diamonds are often treated in what is known as 'rose' cut, that is, the upper surface is shaped to triangular facets of nearly equal size throughout. Stones that are too thin to be cut as brilliants are often treated in this way.

Consult Streeter's *Precious Stones and Gems*, 1898; J. Wodisjaks *Book of Precious Stones*, 1909; Sir A. H.

Church's *Precious Stones, considered in their scientific and artistic relations*, 1913; H. B. Bridgman's *Gems*, 1916; F. B. Wade's *Text-book of Precious Stones*, 1918; and *Diamonds*, 1918; G. F. H. Smith's *Gem Stones*, 1923; C. W. Cooper's *Precious Stones of the Bible*, 1924; E. H. Kraus and E. F. Holden's *Gems and Gem Materials*, 1925; H. B. Walters' *Catalogue of the Engraved Gems in the British Museum*, 1926; M. Weinstein's *Precious and Semi-Precious Stones*, 1930.

Gembloux, a tn. in the prov. of Namur, Belgium. 2½ m. S.E. of Brussels. It was here that Don John of Austria defeated the army under Antony de Goignies in 1578. Pop. 5000.

Gemini (Lat. 'twins') a constellation and the third sign of the zodiac. The sun enters this constellation at about March 20. This constellation derives its name from two bright stars in close proximity, α Geminorum (of the first magnitude) and β Geminorum (of the second magnitude), known respectively from the time of classic antiquity as Castor and Pollux (*q.v.*). The feet of the twins are crossed by the Milky Way, and the constellation contains a fine star cluster, M 35. There are two or three notable double stars in G., notably γ and ζ Geminorum, and a nova was photographically discovered on March 16, 1903, by Professor Turner at Oxford.

Geminiani, Francesco (1680-1762), a violinist and musical composer, born at Lucca. He studied music under Scarlatti and Corelli, following the latter very closely. In 1714 he visited England, where he very quickly became famous. A few years later he went to Dublin, where he devoted his time to music, and later on returned to London, where he died, it is said of grief, owing to the loss of a MS. He is the composer of many concertos and sonatas.

Gemistus Pletho, Georgius (c. 1355-1450), Greek Platonic philosopher. Founded a sect on the principles of Neoplatonism. His treatises on Plato and Aristotle and on Zoroaster were published posthumously. Consult H. F. Tozer's article on Pletho in the *Journal of Hellenic Studies*, vii. (1886). Works printed in Migne's *Patrologia Graeca*, cix.

Gemmi Pass, a mountain pass which crosses the Alps in Switzerland. It rises to a height of 7641 ft., and connects the canton of Valais with that of Bern. Near it, on either side, are the towns Leukerbad and Kandersteg.

Gemsbok, or *Oryx gazella*, a species of antelope which inhabits the desert regions of S.W. Africa. It stands about 4 ft. in height, and its general colour is

greyish. The horns of the male animal measure 42 in. in length, while those of the female may reach 46 or 47 in.

Gendarmes, originally a cavalry regiment, and up to the time of Louis XVI. served as the king's bodyguard. After the French Revolution their functions were necessarily altered, and they are now a military police, consisting of infantry and cavalry. They are a part of the army, although they are better paid than the rest of the army, and may be called out on active service if needed. They have various duties, among them those of policemen. In Palestine, after the Great War, the British Government organised a Jewish and an Arab gendarmerie to keep the peace.

Gender, a distinction made in grammar between words to indicate a difference of sex in the objects denoted by those words. As a general rule in the English language this grammatical distinction agrees with the natural distinction known as sex. Thus names denoting the male sex are masculine G., those denoting the female sex feminine G., and those denoting inanimate objects are neuter G., that is, neither masculine nor feminine. These are cases of natural G., that is to say, the sex and G. agree. This rule is departed from, however, sometimes when inanimate things are personified, as when a ship or engine is made feminine, and the sun and time are made masculine. These are cases of grammatical G., sex and G. being different. In Old English, and also in Latin, German, and Greek, this grammatical G. is much more common, many inanimate objects being either masculine or feminine G., while in modern French and other romance languages the neuter G. does not exist.

Genealogy, a word of Gk. derivation, denoting family. It is the science by means of which the descent or pedigree of a family may be ascertained. Though perhaps hardly of sufficient importance to rank as an independent science, it forms a very important part of history; and there is a growing interest shown in matters pertaining to genealogical research. G. has formed the basis of all true history from the earliest times, and many of the old Gs. have arisen from the desire to explain the origin of the various groups included by them. The first Greek records were those of ancestry, and a wide scope for G. was afforded by the progress of civilisation in states, and, more particularly, by the institution of corporations and guilds in towns. In modern times, the laws of inheritance and the desire to assert the privileges of an hereditary aristocracy have combined to give G.

its importance; more especially those laws of inheritance governing the descent of real estate. It is long, however, before Gs. are found in the possession of private families and scarcely one, though very distinguished, can trace its ancestors even to the middle of the eleventh century. Only after the close of the Middle Ages did Gs. multiply in men's houses and become collected in volumes, but from the sixteenth century onwards they are found in plenty in MSS. and printed volumes. Antiquaries have, for some centuries, made genealogy a favourite study, and their researches have been of the utmost value to the historian and biographer. A host of works are occupied with the G. of English noble families, at the head of which stands Dugdale's great works on the English language. Genealogical research has made great advance during the last generation, and its study at the present time is growing rapidly, not only in England but in the United States, and, to a certain extent, in Germany. Much genealogical material has become available by the publication of parish registers, marriage licence allegations, and such-like; and particularly the mass of evidence contained in the volumes issued by the Public Record Office.

Genée, Adeline, *première danseuse*: b. Jan. 6, 1878, at Aarhus, Jutland. (Married to Frank Seymour Nilsson Isitt.) A pupil of M. and Mme. Alex. Genée; made first appearance as principal dancer at Opera House, Copenhagen, 1895; appeared in Berlin and Munich. First appearance in Empire Theatre, Leicester Sq., Nov. 1897, in *Monte Carlo*. Left Empire Nov. 22, 1907; visited America, London, Amsterdam, America again—a long tour—1910; Australia, 1913; London Coliseum, 1914-5. At Alhambra, Leicester Square, Jan. 1916. Since then charity performances. President, Assoc. of Operatic Dancing of Gt. Britain, March, 1928. Contrasting her art with that of Anna Pavlova, the *Times* (Jan. 24, 1931) wrote: 'Mme. Adeline Genée was brilliant, sparkling, the embodiment of comedy and delicious mischief; and for the expression of these qualities she used her skill. But Pavlova had the soul of a poet.'

General: (1) The title of an officer in the British army who holds the rank next below a field-marshal. There are also other ranks bearing the title G., such as lieutenant-general and major-general, both of which are ranks below the G. (2) In the Roman Catholic Church the title is popularly given to the head of certain religious orders under the pope. To the G. all the

members of the order and all the officials are responsible, and he holds office as a rule for three years, though in the case of the Jesuits it is for life. The G. is only responsible to the pope himself, and is accorded certain privileges in Rome, where he usually resides.

General Assembly, the highest ecclesiastical court in the Presbyterian Church of Scotland, Ireland, and the United States. In the G. A. of the Established Church of Scotland sit representatives from each presbytery, from the universities, and from the royal burghs. This Assembly meets every year in May and sits for about ten days as a general rule. It contains both laymen and clergymen, and has judicial and legislative power, and cases brought from lower courts are settled in this one. It is also connected with the state, as a commissioner is always appointed on it to represent that body. In the other Presbyterian churches the G. As. are very similar, the only difference being in their constitution and in certain unimportant particulars.

General Electric Company, registered as a limited liability company in 1900 to take over the business of that name which had been registered July 25, 1889. The Chairman is Sir H. Hirst, Bart. The authorised share capital is £7,600,000, of which £5,853,645 is issued and paid up. There are borrowing powers equal to the nominal share capital, and against these 7 per cent. debentures have been issued, and are outstanding to the extent of £3,068,060. There are 2,253,645 ordinary £1 shares, 1,600,000 cumulative preference shares at 6½ per cent., and an equal number at 7½ per cent. The dividend for the last three years has been at the even rate of 10 per cent., and the reserve is £1,230,000. In 1918 the company acquired the freehold and leasehold works of Messrs. Frasers and Chalmers at Erith, and also the Osram Lamps, Ltd. The Peel-Connor Telephone works were acquired in 1920.

General Electric Company (America), manufacturers of electric locomotives, motors, and all kinds of electric machinery and appliances, was organised under special charter of the State of New York in 1892. It has an issued capital of \$35,000,000. An interesting feature of its preference shares is that the 6 per cent. interest they carry for the general public is increased to 8 per cent. on shares held by employees as long as they remain in the service of the company.

Generalisation, a term in logic and philosophy denoting the inclusion or grouping under one general head of a

number of individual objects or persons, ignoring all incidental differences and minor qualities and considering them solely from the point of view of their common characteristics. In logic the genus is a higher class including the lower class or species. Hence it follows that the wider a G. is, the less specific it becomes.

Generalissimo, the title given to a man who is commander-in-chief of several armies having under him other commanders, or of several divisions of the one army acting separately. This name is only used on the continent.

General Motors Corporation, an important firm of motor car manufacturers in America, which owns, among others, the following cars: Chevrolet, Pontiac, Oldsmobile, Oakland, Buick, La Salle, and Cadillac. It was established Oct. 13, 1916, to take over a company of a similar name which had been founded in 1908. It has an authorised capital of \$750,000,000, of which \$435,000,000 is issued, and the present price of the 10-dollar share averages about 40 dollars. The company is associated with the Standard Oil Company in controlling the stock of the Ethyl Gasoline Corporation. It also controls the General Motors Acceptance Corporation, organised under the Bank Laws of the U.S.A. This corporation was brought into being in order to discount the acceptances of customers, and assist them to finance business. The British interests are in the hands of General Motors, Ltd., a private limited company, of which Mr. C. J. Bartlett is the managing director, and which was registered in 1909. The corporation also has factories in Canada and assembly plants in most European countries, Africa, Australia, New Zealand, Japan, and in the different countries of America. The corporation controls the Vauxhall Motors Ltd., of Luton, Bedfordshire, England, and the Opel Motor Company of Germany.

General Paralysis consists in a gradual loss of power of mind and body, usually regarded as being due to a specific cause. It mainly attacks adult males between the ages of thirty and fifty. The onset is generally attributed to monotonous mental occupation, anxiety, or mental strain, and often becomes more apparent after injury. It is apt to occur in persons of hereditary nervous dispositions. It affects the face and speech, muscular power, and the condition of the eyes.

Vision.—The condition of the pupils is often one of the first symptoms to be noticed; they dilate and

contract irregularly when exposed to light and shade, as well as when regarding objects near at hand and at a distance. There are also other visual defects.

Muscular power.—The gait becomes irregular, often resembling that of a drunken man, and in a late stage the muscles are so seriously affected that the patient is bedridden. The difficulty is particularly noticeable when the patient tries to walk in the dark and when the eyes are shut. The speech becomes thick and indistinct, especially when pronouncing long words and complicated sentences, and a peculiar convulsive tremor affects the upper lip if there is the least excitement. The face becomes dull and apathetic, or absolutely fatuous. The mental affections are often amongst the first symptoms, and always occur sooner or later. Patients become grandiose, and imagine themselves to be much richer or cleverer than they are, with consequent extravagance of ideas and expenditure of money. This is one of the most fatal and incurable forms of paralysis and mental affection, as recovery is of very rare occurrence. The course of the disease is apt to be prolonged, lasting from one to two, or even to ten or twenty years.

General Staff, the body of officers who direct the general training of the various armies, collect and distribute intelligence, prepare schemes of attack and defence, and are charged with maintaining the army in the highest state of general efficiency.

General Steam Navigation Company, Ltd., owes its origin to a group of steam packets which in 1820 plied between London and Margate; in 1824 it was decided to extend their trade to the ports lying between Hamburg and Brest, and later on to the Mediterranean, and offices were established in Oct. of that year in Crutched Friars, E.C. Steamships were then an innovation, but by 1842 they had been so greatly improved that Queen Victoria journeyed in the G.S.N.C. vessel, *Trident*, from Scotland to London. In 1902 the company was changed into a limited liability company, and in 1909 it occupied the offices at 13 Trinity Square, E.C.3, where it is housed to-day. During the Great War many vessels were requisitioned by the Admiralty as troopships, while others carried cargoes of food to Holland for prisoners of war and the Belgians, bringing back supplies of food to England; twenty-three were lost by enemy action. In 1919 offices were re-opened or established in Germany, Holland, Belgium, France, and Italy. At the beginning of 1931 there were

44 sea-going vessels (named after birds, from the *Adjutant* to the *Yellowhammer*) and 8 summer passenger ships and tugs, with a total gross registered tonnage of 49,227; while 32 wherries and lighters (named after trees and gems, from *Birch* and *Bloodstone* to *Topaz* and *Yew*), with a tonnage of 1582, formed the fleet of the G.S.N.C. Ltd. See L. Cope Cornford's *Century of Sea Trading, 1824-1924*, published on the occasion of the centenary of the Company, 1924. The company is part of the Inchcape P. and O. group.

Generations, Alternation of, see ALTERNATION OF GENERATIONS.

Genesis (Heb. *bereshith*), the opening word, the first book in the Pentateuch (the Torah).

Contents.—This tells of the creation of the world; and of Man; the full offering of the first sacrifices; the genealogies of the lines of Cain and Seth; the Flood; the blessing of Noah, the division of the races of mankind, etc. Genesis is really an introduction leading up to the legislative portions of the Pentateuch, gradually becoming more detailed until the descent into Egypt. It is occupied with the history of the Patriarchs from the calling of Abraham, in fact about four-fifths of the book is taken up with this, and more than half with Jacob and his family.

Sources.—Although the supply of the material for the construction of the book may have been largely drawn from myth (parable) and legend (tradition), it must not be forgotten that writing was practised by regular scribes long before the call of Abraham, and records on tablets of clay may have been in existence, giving an account of the events. We must either call upon the imagination or revelation for the account of the creation, and unless we deny the possibility of the latter, we must regard it as psychologically the most probable.

Date.—Without assuming that Moses was the author, we find that many of the events of Genesis were well known to the earlier prophets, and the book may have been compiled during the literary activity of the schools of prophets in the days of Samuel. While, however, everything points to a gradual process of editing, the exact time cannot be determined.

Authenticity.—While parable and tradition may have been freely used, we must not forget that the destruction of the records of the Hyksos kings of Egypt by the dynasties that succeeded them renders the want of all reference to the history of Joseph of little probative force, and, all things

considered, the odds against Abraham and his allies at Damascus (a common objection) were hardly greater than those against the Gks. at Marathon. The order observed in the G. story of Creation need not be regarded as the actual chronological order of the creation of things.

Genetics. Genetics is concerned with the origin of individuals, varieties and species, and with the causes of similarities and differences between individuals and their ancestors. The term G. was suggested in 1906 by Bateson, who did much to establish and forward the study of the science by his careful observations and experimental work in connection with the breeding of plants and animals. (See BREEDING and BOTANY.)

G. is intimately connected with the study of heredity (see HEREDITY and BIOLOGY) and with cytology (see CELL), for its great problems are those of the ways in which offspring inherit certain characteristics and yet at the same time have individual differences. How these arise, how resemblances are contained in the egg, manifest themselves at various stages during development, and are again passed on to generations of descendants, are problems for the geneticist to solve. The elucidation of certain problems arising in the study of groups of individuals has been made possible by biometric methods.

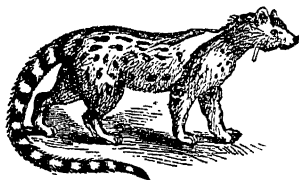
Results of research in G. have been successfully applied to eugenics, to scientific breeding, and to the study of evolution.

Bibliography.—*Genetics and Eugenics*, Castle; *Genetics in Relation to Agriculture*, Babcock and Clausen; *Evolution and Genetics*, Lindsay; *Problems of Genetics*, Bateson.

Genette (Arabic *jarneit*), or *Genet*, the name given to a genus of carnivorous mammals belonging to the Viverridae; they are allied to the civet

the S. of Europe, Syria, and Africa. *G. vulgaris*, the common G., runs wild in France and Spain, and is sometimes domesticated and trained to kill rats and mice.

Geneva (Fr. *Genève*; Ger. *Genf*): (1) A canton in the S.W. of Switzerland, bounded by the lake of the same name, the canton of Vaud, and France. The Rhone and numerous mountain streams water the country, which is hilly; but the soil has been made fertile by persistent cultivation. The chief industries are fruit-growing and the manufacture of articles of jewellery and clocks and watches. G. was admitted into the Swiss Confederation in 1815. Area, 108 sq. m.; pop. 170,000. (2) A city in Switzerland, cap. of the canton of the same name. It is of great antiquity and is mentioned in Caesar's *Commentaries*. It acknowledged Rom. supremacy in 120 B.C. In 456 it came under Burgundian sway, and was incorporated with the kingdom of the Franks in 534. G. is one of the most conspicuous places in Europe, owing to the celebrated part it has played in European civilisation as the centre of Calvinism. Calvin went to G. in the year 1536, and by his work there made it one of the chief religious centres throughout Europe. Since the end of the eighteenth century, it has become the centre of a remarkable scientific activity. It is famous as having given birth to Rousseau, De Saussure, De Luc, and many other celebrated men, and its educational institutions and scientific collections are deservedly noted. Prior to 1847, G. was surrounded by walls, and its streets were narrow and ill-drained; but after that year the town was entirely rebuilt in modern style. Its monuments are of no very great magnificence, though it has some antique and picturesque buildings, and a fine statue of Rousseau is erected in its public pleasure-grounds. It is also beautifully situated, the course of the Rhone through the town forming two islands. The principal edifices are the cathedral of St. Peter, the academy founded by Calvin, and now converted into a university, the fine theatre, ranking next in size to the Paris Opera House, the Athenæum, and several museums, notably the Museum of Natural History, containing De Saussure's geological collections. An Institute of Higher International Studies was founded in 1927. G. was chosen as the seat of the League of Nations, for which a new building and conference hall are to be built. Designs were chosen after an international competition held in 1927. Its chief industry is the manuf.



COMMON GENETTE

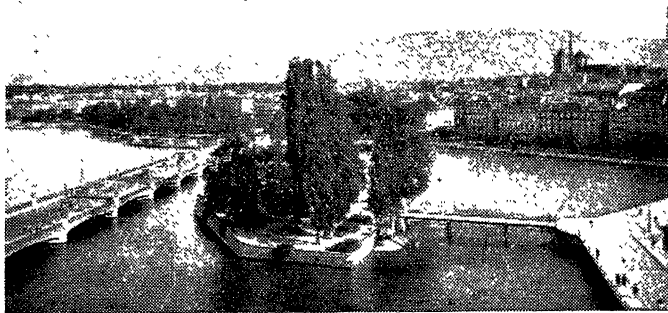
but differ in being smaller and in the comparative faintness of their musk-like odour. Their fur is soft and often beautifully marked, the general colour being grey. They range over

of watches, clocks, jewellery, and musical boxes, in which articles it carries on a considerable retail trade. Diamond cutting and enamelling are also carried on to some extent. Pop. 135,000. (3) The lake of G. is situated between Switzerland and France; the larger portion belonging to the former country. It is in the form of a crescent and is 45 m. long and 9½ m. broad, its total area being 225 sq. m. At certain periods of the year the surface of the lake is subject to sudden rises and falls, probably due to differences of barometric pressure on different parts. These phenomena are known as *seiches*. Mirages are also at times observed on the lake. The southern Fr. shore has the

shore of Lake Seneca. It is the seat of the State Agricultural Experiment Station and of Hobart College (Protestant Episcopal), which was opened in 1822; also the William Smith College, and the Smith Observatory. G. was settled about 1787 near the site of an Indian village, and chartered in 1898. Gen. Lafayette held a reception here in 1825. There are large nurseries, and manufs. of motors, engines, optical instruments, canned goods, etc. Pop. 16,053.

Geneva, see GIN.

Geneva Convention. This Convention or treaty was originally adopted at a national conference held at Geneva, Switzerland, in 1864, but



[Swiss Federal Railways

GENEVA

Savoy Mts. in the background, and is of a solemn and stern character, while the shore on the side of the Pays de Vaud has become quite a classic spot on account of its association with men of note. J. J. Rousseau mentions it in his *Nouvelle Héloïse*, and Byron in *Childe Harold* and *The Prisoner of Chillon*. Mont Blanc, though 60 m. distant, is visible from the lake, and is often reflected in its waters. At the upper end of the lake the Rhone enters it, turbid and yellow, but at the town of G. leaves it limpid and azure-tinted. It has many historical resorts on its shores, which attract both tourists and winter residents—Vevey, Montreux, Coppet, Ferney, etc. Lake dwellings have been built on its shores. A railway runs along its N. and S. shores. In the harbour are two great granite rocks, named Pierres du Niton, which project above the water and are known as Neptune's Altars. (4) A city of Ontario co., New York, U.S.A., situated on the northern

was afterwards replaced by the Convention of July 6, 1906, also adopted at Geneva. It was an international agreement, chiefly respecting the succour of the wounded in time of war, and it forbade all cruel methods of warfare. It was signed by twelve delegates from various countries, and later received the adherence of every civilised power excepting the United States. In 1870-1, during the Franco-German War, it formed a Red Cross Society, which was very prominent and helpful, the 'Geneva Cross' flag adapted from the insignia of the old military Order of St. John being recognised as neutral. International conferences promoting the same objects were also held at Paris and Berlin. The adoption of the new G. C. of July 1906 resulted in a new edition being adopted at the Peace Conference of 1907. The last G. C. (Oct. 1907) consists of thirty-three articles, under the following nine divisions: (1) wounded and sick, (2) medical units and estab-

ishments, (3) personnel, (4) material, (5) convoys of evacuation, (6) the distinctive emblem, (7) application and carrying out of the convention, (8) prevention of abuses and infractions, (9) general provisions. The principles of the G. C. were by the Hague Convention of 1899, extended to naval warfare.

Geneva Protocol (1924), or protocol for the Pacific Settlement of International Disputes, represents an attempt by the League of Nations to find a solution of the ambiguities and vagueness of the Covenant of the League (*see* COVENANT OF THE LEAGUE OF NATIONS). The defect of the Covenant lies in its inherent ineffectiveness to afford a satisfactory solution of the related problems of security, arbitration and disarmament (on this *see* ARBITRATION). It was adopted by the Fifth Assembly of the League, and though it was rejected by the govts. concerned, it is of historical importance in that it reveals in clear relief the salient problems concerning Europe in the post-War period. In the Protocol, the League sought to tighten up the sanctions (*i.e.* penalties) against aggressive wars and also to increase the number of occasions on which those sanctions should become applicable; and these reforms involved a determined attack on the problem of disarmament. But the Brit. representatives at the Council of the League would agree to nothing which should compel them to state in advance their country's quota contributions to the military, naval and air forces (necessary to ensure the fulfilment of the obligations of the Covenant) nor surrender the right to determine for themselves those contributions. All the Protocol did in this respect was to oblige each signatory State to co-operate loyally and effectively in support of the Covenant and in resistance to aggression 'in the degree which its geographical position and its particular situation as regards armaments allow.' Thus, though the Protocol added nothing to the legal sanctions (of Article 16 of the Covenant), it raised the moral obligations imposed on League Members; but the failure of the attempt to convert Article 16 of the Covenant into a rigid piece of machinery represented a victory for the British point of view as expressed by Mr. Ramsay MacDonald, the Brit. Prime Minister. In its next aspect, the Protocol, in a proposed amendment of Article 12 of the Covenant, ruled out absolutely the legality of war except in two cases: first, when the nation in question was, in self-defence, resisting an act of aggression;

secondly, when it was acting on behalf of the League against a recalcitrant State. The weakness of previous attempts to deal with 'aggressive' war lay in the difficulty of defining 'aggression,' and the 'automatic' test supplied by the Protocol (suggested by the American group, including General Bliss (*q.v.*) and Mr. Miller) was one of the improvements of the P. upon previous draft treaties. The test of aggression in the Protocol was the refusal to submit a dispute to the procedure of pacific settlement provided by Articles 13 and 16 of the Covenant as amplified by the Protocol, or, in other words, a party to a dispute would not only have to refer to one or other forms of arbitration, but be compelled to comply with the judicial sentence or arbitral award which resulted therefrom. From the British point of view, however, the fundamental weakness of the Protocol was that the British Parliament was asked, in effect, to surrender to what might be a group of unknown men in no way responsible to it those powers of peace and war which it had claimed to exercise for centuries, and that is why Great Britain refused to ratify the Protocol. The rejection of the Protocol was a great disappointment to supporters of the League in England and elsewhere, but at bottom the refusal was in the best interests of the League, in that it prevented the League from becoming too rigid and too much assimilated to a super-state looking to conformity rather than to cordial co-operation. If it failed, it is none the less of historical importance in that it marked a real advance in political thought in Europe and undoubtedly paved the way for the subsequent acceptance of the Locarno Treaties (*q.v.*).

Geneviève (or **Genovefa**), **Saint** (c. 422-512), the patron saint of Paris. According to tradition she was b. at Nanterre, then went to Paris, where she became famous for her benevolence and for her predictions of the future. Her festival is celebrated on Jan. 3, and relics connected with her are preserved at the church of St. Etienne du Mont. Puvis de Chavannes' great frescoes in the Pantheon in Paris illustrate her life works.

Geneviève of Brabant, an eighth-century saint and heroine of mediæval legend. Said to have been the wife of the palatine Siegfried, she was falsely accused of adultery and condemned to death, the punishment being commuted to exposure in a forest. The story goes that she wandered Diana-wise for some years when she was found by Siegfried during one of his hunting expeditions

and her innocence acknowledged. She is honoured as a Rom. Catholic saint.

Genghis (or Jenghiz), Khan (1162-1227), a Mongol emperor; the son of Yesukai, his mother's name being Yulun. He was b. by the R. Onun, and was only thirteen when his father died. His name was Temuchin, which he changed in 1206 to Jenghiz, in Chinese 'Cheng-Sze' (perfect warrior). His victory over the Naiman Mongols left him undisputed ruler in Mongolia, and after crushing the Merkit Khan on the R. Irtysh, he moved towards N. China, then occupied by the Kin Tatars. By 1213 three of his armies were sweeping from victory to victory, wiping out cities till the whole country N. of the Yellow R. was in his hands, except Yenking (Peking). G. moved back to the W. and crushed the Khitanes and the Shah of Khwarizm (Khiva), whose territory on the Oxus was the key to the Caspian and so to Europe. G. or his sons then in turn conquered Bokhara, Samarkand, and Merv, sacking and destroying the towns and putting all the inhabitants to death. His powerful rival, Mohammed of Khwarizm, died, and G. pursued his son, Jelaeddin, to Herat and thence to India. Meanwhile other armies had invaded Russia with the same astonishing success, and when G. died, in 1227, on a journey in Mongolia, his empire stretched from the Yellow Sea to the Dnieper. See Sir R. K. Douglas, *Life of Jenghiz Khan*.
Genii, see JINN.

Genista, a genus of leguminous plants found in the Old World and represented in Britain by three species. *G. tinctoria*, the dyer's green-weed, found in British fields, pastures, and thickets, is noted for the yellow colour obtained from its flowers and used in dyeing wool. The seeds act as a mild purgative. The *Planta Genista* was the badge of the Plantagenet kings.

Genius. In ancient Rom. mythology, each individual, at birth, is endowed with or has allotted to him a special protecting, guarding spirit, influencing his character, and with whom rests the power of good or ill fortune, happiness, and misery. As the spirit, from birth, presides over the generating principle (Lat. *genius* is from root *gen-, gignere*, to protect), the G. is masculine; the women looked to her Juno, especially Juno Lucina, the guardian and protectress of women in childbirth. Though not a household god, offerings and sacrifices were made to the G. of the father of the family (*paterfamilias*), and the marriage bed is named *genialis*, and dedicated to the spirit. It is by his G. that a Rom. swore. The Gk.

dæmon is sometimes taken as a parallel, but the idea of evil or good *dæmones* was purely Gk., and the G. is peculiarly Rom., or, rather, Italian. When the early Rom. religion became influenced by the pantheon of the Gks., and a more personal view of the various deities came into vogue, they, too, had *genii* designed to them, and the custom spread of having a G. of cities, of trades, and guilds, and especially of the people or nation itself; thus, there was a *genius publicus populi Romani* as well as a *genius urbis*, i.e. Rome. The personal G. of the emperors was publicly worshipped. Eng. has taken the word 'genii,' generally altered to 'genie,' as a translation, usefully representing the pronunciation of the Arabic *djinn* or *jinn*, the beneficent or maleficent spirits of their folk-lore and mythology.



GENISTA TINCTORIA

Genlis, Stéphanie Félicité, Duces de Saint Aubin, Comtesse de (1746-

1830), a Fr. writer, b. at Champcéry, near Autun. In 1770 she became lady-in-waiting to the Duchess of Chartres and was made governess to her daughters, and in 1781 the duke appointed her as tutor (*gouverneur*) to his sons, and despite the scandal and the resignation of the other tutors, she carried on their education until 1793, when she had to leave France. After the Restoration she wrote in defence of monarchy and of religion. When she was past eighty years of age, she wrote her memoirs. She lived to see the events of July 1830, and her former pupil raised to the throne. She died on Dec. 31, aged 84. Her methods of education seem to have been considerably in advance of her time, and we hear of her illustrating her history lessons by magic lantern slides, and teaching botany while out for walks. Her works are numerous and of some historical value; they include: *Théâtre de l'Éducation*, 1779-80; *Adèle et Théodore* (comedies for children), 1782; *Mémoires inédits sur le XVIII. Siècle*, 1825; and a romance entitled *Mademoiselle de Clermont*, 1802. See M. de Chabreul, *Gouverneur de Princes 1737-1830*, 1900; and G. Maugras, *L'Idylle d'un Gouverneur*, 1904.

Gennadius II., or George the Scholar (c. 1453-c. 59), Gk. patriarch of Constantinople. It is uncertain whether he is the 'Scholarius' that accompanied the Emperor John Palæologus to Florence in an effort to unite the churches of East and West, and afterwards became a monk in Constantinople and an opponent of union. After capture of Constantinople by Turks, 1453, G. was made patriarch by Sultan Mohammed II. After four or five years, he retired. An Aristotelian, he wrote much. Died in the monastery of St. John the Baptist near Servae, Macedonia, between 1459 and 1468.

Gennesaret, Sea of, see GALILEE, LAKE OF.

Genoa: (1) A province in the kingdom of Italy, situated between the N. Apennines and the Gulf of Genoa. It embraces the coast of the Riviera, and contains some of the most beautiful as well as the best cultivated and richest districts of the country. It has an excellent climate, and fruit abounds there. It covers an area of 1582 sq. m.; pop. (1921) 975,700, consisting chiefly of seafaring folk. (2) (It. *Genova*) A city of Italy, situated on the gulf of the same name. It is a large maritime and commercial town and a very important seaport. The city is surrounded by a wide extent of country, and presents an enchanting view from the water as it

rises towards the summit of verdant and richly-cultivated hills. It has some fine streets, though some of its thoroughfares are very narrow and ill-lighted, and it contains many grand palaces and churches. Of the former, the most famous are the ducal palace, formerly inhabited by the doges, but now used for meetings of the Senate; and the Doria, the residence of the celebrated Andrea Doria during his presidency of the republic, and presented by him in 1529. There are several others also of great interest on account of their architectural beauty and historical fame, and many of them contain galleries of paintings with works of Van Dyck, Rubens, Albrecht Dürer, etc. The most noteworthy churches are: S. Maria di Carignano, of great architectural beauty; S. Annunziata, and S. Lorenzo, the cathedral, built in 1100, a grand old pile in the Italian-Gothic style, which has been restored at frequent intervals. The commerce of G. is widespread and important, and its manufactures are considerable. Household furniture, cabinets, silks, velvets, laces, and coral and silver filigree work are manufactured on a wide scale, and have a noted reputation. The chief industrial establishments of the city are ironworks, cotton and cloth mills, tanneries, paper factories, etc. It imports principally sugar, coffee, coal, hides, raw wool, fish, and petroleum. The Genoese are renowned for their enterprise, and are an active, hard-working race, possessing all the qualities of a maritime community. They are skilful and hardy seamen, and ship-building is carried on to a large extent, many ships being built for foreign countries. G. is the nearest port for Western and Central Germany since the important improvements in railway connection in the construction of the St. Gothard Railway, which has largely increased its commercial prosperity. An outer harbour has been constructed with another basin for coal vessels, while a still further extension is in progress. The minimum depth of the harbour is 30 ft., and the largest ships can enter. It has two dry docks, a graving dock and a floating dry dock. There is a large emigrant traffic with S. America and a large passenger traffic with both America and the East. Industry has developed enormously of late years; armoured cruisers both for the Italian navy and for foreign govts. are constructed in the Ansaldo yards, also merchant and passenger steamers in the Odero yards. Tanneries, cotton mills, cement works, etc., have also shown a great increase in output. The

four main railway lines which centre on Genoa have all been electrified. The schools of G. are numerous, and the University founded in 1471 is a flourishing institution, with faculties in law, medicine, science, engineering, and philosophy. A library, observatory, and physical and natural history museum are attached to it. Its charitable institutions are said to be the finest of their kind in Italy, including hospitals of various kinds and asylums for the poor. The chief focus of traffic and the centre of the Genoese tramway system is the Piazza Ferrari, which is a large irregular space embellished with a fine equestrian statue of Garibaldi, unveiled in 1893. The Via Roma is another important centre of traffic leading to the Piazza Corvetto, where stands the colossal equestrian statue of Victor Emmanuel II. Genoa was at one time occupied by the Gks. It came into the possession of Rome at the close of the third century B.C. After the fall of Rome it passed eventually into the hands of the Franks—finally, in the tenth century, asserting its independence and developing into a powerful republic. Long rivalry between the republics of Genoa and Venice terminated in the favour of the latter. The republic came to an end with the outbreak of the Fr. Revolution and became part of the Ligurian Republic. In 1815 it was united with the kingdom of Sardinia. Pop. 316,500.

Genoa, Conference of (1922). The European Economic Conference was opened at Genoa on April 10, 1922. British self-governing Dominions and twenty-nine European States were represented, including Russia, but excluding Turkey. The U.S.A. were invited, but declined. The principal business of the Conference was the renewal of economic relations between Soviet Russia and the other countries of Europe. At the first Plenary Session, four Commissions were appointed to examine the various conditions for restoring international confidence without injuring existing treaties. Informal discussions followed, but on April 17 two delegations had concluded a separate Russo-German Treaty at Rapallo providing for mutual renunciation of reparations and the resumption of diplomatic and economic relations. The result of this treaty, although in the spirit of the Conference, served to prejudice the delegations of other countries. On April 25, Lloyd George proposed a Pact of Non-Aggression, to the terms of which there were Fr. and Belgian objections. On May 14, at a meeting of the Allied Powers (including Belgium), it

was recommended to remit the business of the G. C. to a Mixed Commission of Experts, as had been suggested in a Russian Note of May 11. The Experts' Conference was to meet on June 26, and until that time there was adherence to the Pact of Non-Aggression by the members of the G. C., and this possibly prevented a war between Russia and Poland.

Genoa, Gulf of. This is the name generally given to the Mediterranean N. of Corsica, where the coast of Italy retreats with a curve. It receives numerous small rivers, the chief inlet being the Gulf of Spezia, on which is situated the city of Genoa.

Genovesi, Antonio (1712-69), an Italian writer on philosophy and political economy, b. at Castiglione. He started his career as an ecclesiastic, but very soon abandoned theology in favour of the law, which in turn was also given up for philosophy. In 1754, one of his patrons, Bartolomeo Intieri, a Florentine, founded the first Italian or European chair of political economy on condition that G. was made first professor. His works include: *Elementa Metaphysica*, 1743, et seq.; *Logica*, 1745; and *Lezioni di Commercio*, the first complete Italian work on economics.

Genre Painting takes for its subject the familiar scenes of everyday life while 'historical painting,' in contradistinction to which the term has come to be used, takes great events.

Gens, in historical and ethnological use, a tribe or clan, or any group of primitive people forming a distinct branch of a race. The term was especially applied to a clan or house in ancient Rome which included a number of families bearing the same name and descended from a common ancestor, and also sharing certain legal privileges and obligations, and also religious rites. Originally these *gentes* were exclusively patrician, but later they included plebeians. The name of the *gens* to which a Roman belonged was indicated always by the middle of the three names which it was customary for a Roman to possess.

Genseric, or Gaiseric (428-477), King of the Vandals, b. about 390, and was the son of King Godegisel. He succeeded his brother Godeoric. He at once invaded Africa from Spain, besieged the Roman general Boniface in Hippo and conquered the province with much pillage and slaughter. In 455 he invaded Italy, sacked Rome, and brought back Eudoxia, the empress, captive. Majorianus, the Roman emperor, in 460, and Leo I., the Eastern emperor, in 468, failed in their attempts at vengeance, and G. conquered Sicily, Sardinia, and the

Balearic Isles. As an Arian he was a cruel persecutor of orthodox Christians. He was short and lame, but he long remained the great warrior king of the Vandals.

Gentiana, a cosmopolitan genus of plants typical of the order Gentianaceae. The gentians grow chiefly in Alpine regions, and are noted for the brilliance of colouring in their flowers,



GENTIANA
PNEUMONANTHE
(Common Gentian)

and their intense bitterness, which makes them of great medicinal value. *G. lutea* is a perennial bearing yellow flowers, and is frequently cultivated; it is the species most used in medicine. *G. campestris* and *G. acutis* are found in Britain.

Gentianaceae, a natural order of dicotyledonous plants cosmopolitan in distribution. It contains between seven and eight hundred herbs and shrubs, famed for their bitterness and the bright yellow, red, or blue of the flowers. The inflorescence is cymose, and the flowers are hermaphrodite; there are typically five united sepals and petals, five epipetalous stamens, two united carpels to form a superior ovary with numerous ovules; the fruit is a capsule or berry. Two of the chief genera are *Gentiana* and *Meryanthus*.

Gentile da Fabriano, see FABRIANO.

Gentile, Giovanni, Italian philosopher, b. May 29 or 30, 1875, at Castelvetro; son of Giovanni G. Educated at University of Palermo. In 1918 became Professor of the History of Philosophy in the University of Rome. He was made senator the same year. In 1920 he founded the *Giornale critico della filosofia italiana*. He was in the Fascist ranks from the first, and became Minister of Education when Fascism captured the gov. His philosophy, which he has implemented in his ministerial work, is a tran-

sceding of that of Croce, being even more lyrical and objectless in its professions. It is, in practice, the philosophy of Fascism: with its roots in Vico; who believed in a something corporate, not composed of our individual selves, that makes for national glory. With Croce, precedent and idea have some controlling force; with G., apparently none—the dominant will is sufficient reason. He has been writing since 1899, and has written a whole library.

Gentilis, Albericus (1551–1611), famous Ital. jurist, b. in San Ginesio, in the March of Ancona. He was a doctor of civil law of the University of Perugia, but left Italy in consequence of having adopted Protestantism. In 1588, through the patronage of the Earl of Leicester, he became Regius Professor of Civil Law at Oxford. His chief work is the *De Jure Belli libri tres*, 1598, but his earliest known work was the *De Legationibus*, pub. in 1585. The *De Jure* was an enlargement of the *De Jure Belli commentatio prima*, published in 1588, and two other treatises published the following year. They treat of the laws of war, the causes of making it, the mode of carrying it on and the rights of conquerors and conquered—all opportune topics at the time England was threatened by the Armada (1588), when the conduct that would be pursued by the Eng. Catholics or the question whether a Papist was right in serving his prince in arms against the Pope raised important issues. According to Professor Westlake, G. rushed into print in 1589 without giving himself time to elaborate his important subject with the fullness he afterwards gave it in the largely expanded work of 1598. This classic, indeed, is admittedly superior to the work of Ayala (*q.v.*), being far more complete and free from the irrelevant consideration of tactics and military administration. But it is inferior to the work of Ayala in principles, notably in his manner of dealing with the cardinal problem of whether a war can be *justum bellum* on both sides, so as to have legal effects, e.g. in changing the property of things captured. Nothing, too, is to be derived from G. in mitigating the ferocity of war; and, again, he agrees that it is both just and expedient to kill hostages. The best Eng. edition of the *De Jure* is that of Professor Holland, published in 1877. See also *The Collected Papers of John Westlake on Public International Law*, 1914. G. d. at Oxford.

Gentleman. The term 'G.' is of very vague and shifting meaning

to-day, but though it has almost become a politer synonym of 'man,' as 'lady' has of 'woman,' every one recognises that, properly regarded, it implies something of good manners, good taste, good education, and good feeling to others. In a more usual and general sense it is applied to one of a certain social position, and its definition may range from the celebrated one of the witness in Thurtell's trial as a 'man who kept a gig,' to that of one who, by birth, education, wealth, or manners, occupies a certain place in society without, nowadays, much reference to his profession, business, or trade. It is of more interest to turn to the history, which has been much confused since, in the sixteenth and seventeenth centuries, a fiction of official heralds made 'G.' and 'gentry' a separate order or rank and confined its members to those who had the right to bear a coat of arms as recognised by the College of Heralds. Antiquaries and historians have much disputed as to whether in England there ever was a distinct order corresponding to the lesser noblesse of France or Germany (*Adel*). Certainly there never was a distinctive mark attached to a name, signifying such a rank as is found in the nobiliary particles *de* in Fr. or *von* in Ger. Early Eng. records in which 'de' occurs imply the place where the man or family lived, and in the fifteenth century was dropped; thus William de Pedlington became William Pedlington. Apart from this, the definite early meaning was that of its derivation, a man of 'gentle' birth, Latin *gentilis*, and so in genealogies, etc., *generosus*. For fuller accounts the reader must refer to Selden's *Titles of Honour*, 1671; William Harrison's *Description of England*, ii. 5, 1517; and the most interesting researches of Sir George Sitwell, 'The English Gentleman,' *Ancestor*, April 1902; and for an exhaustive collection of quotations etc., A. Smythe Palmer, *The Ideal of a Gentleman*, 1908.

Gentleman's Magazine, **The**, was established in 1731 by Edward Cave, and was the first example of the use of the term 'magazine.' It was, from the start, valued for its plates and engravings, and especially for its biographical, historical, and antiquarian articles, which make its old volumes a store-house of curious and interesting information. Samuel Johnson joined the staff in 1738, and his writing, from notes taken by others, of the reports of debates in parliament is a well-known landmark in the history of parliamentary reporting. The magazine, with its

familiar editorial name of 'Sylvanus Urban,' continued on the original lines till 1863, when a new series of lighter type was begun. A revival in 1904 on the old lines was not protracted.

Gentlemen at Arms, in full the 'King's Bodyguard of the Honourable Corps of Gentlemen at Arms,' consists as at present constituted of thirty-nine 'gentlemen,' being officers of the army who had received a decoration for war services, with a clerk of the cheque or adjutant, a sub-officer, a standard-bearer, a lieutenant, and a captain, the last of whom must be a peer and a member of the Ministry retiring with the gov. The corps was established as a purely military body in 1802, and officiates as the first bodyguard of the sovereign at palace functions and royal ceremonies. It directly descends from the body of 'pensioners,' founded by Henry VIII. in 1509, who were the younger sons of noble families. In the eighteenth century the corps practically lost its early military features until its reconstitution.

Gentz, Friedrich von (1764-1832), Ger. publicist and statesman, b. at Breslau. Roused to interest in the outside world by the Fr. Revolution, his first literary effort was a translation of Burke's essay on that subject (1794), which was followed by other translations and the founding of a journal in which his brilliant articles soon became famous. He served for a time under the Prussian gov., but in 1802 various causes combined to make him leave Berlin, and he went to Vienna and entered the service of the Emperor Francis. A brief visit to London brought him into touch with Pitt and Granville, and with his wonderful grasp of affairs he used his pen unsparingly against Napoleon. Throughout the war between Austria and France he was employed by Stadion in writing proclamations, etc., and, when Metternich succeeded the latter, he became his chief adviser. He was secretary to the Congress of Vienna (1814-15), and to all those that followed, and remained a power until his death. He has been accused of being a 'mercenary of the pen,' but though he undoubtedly received large sums for his writings, he was quite fearless, and always wrote from conviction, and his brilliant gifts are undeniable; his writings are valuable both as history and literature. See E. Guglia, *Friedrich von Gentz* (Vienna), 1901.

Genuflexion, the act of touching the ground with the knee, used especially when it is done as an act of worship at a religious service.

Genus. In biological nomenclature, when several species resemble each other so distinctly that their general characters indicate relationship, they are grouped together in a G. Similar genera are grouped together to form a family. Systematic classification is as natural as possible, but it is often difficult to know where to draw the line; but in all cases the characters which distinguish one G. from another must be greater than those distinguishing the species of the genera. The family Ranunculaceæ is made up of many genera, of which *Ranunculus*, *Clematis*, *Aquilegia*, and *Thalictrum* are a few examples. They belong to one family, but differ from one another in sufficiently characteristic details, so that each may constitute a G. They are further subdivided into species; thus we have *Ranunculus aquatilis*, the water buttercup; *R. ficaria*, the lesser celandine; *R. acris* the common buttercup, etc.

Geodesy (Gk. $\gamma\eta$, and $\delta\alpha\iota\epsilon\iota\nu$, to divide), the science of surveying on a large scale, so as to determine the form and area of the earth. The problem of finding out the dimensions of the earth has occupied men's minds from the very earliest times. In the third century B.C. Eratosthenes made a calculation somewhat as follows: assuming the earth to be spherical, then if the positions of two places and the shortest distance between them be found out, the dimensions of the sphere can be found. Eratosthenes took Syene and Alexandria as the two points, and assumed them both to be on the same meridian, and Syene to be on the tropic of Cancer. The altitude of the sun at Alexandria was found by the gnomon at midsummer, and from this, with the distance between the two places, the length of the earth's circumference was calculated. The result of this early calculation was surprisingly accurate. The advances in scientific knowledge, and the existence of better instruments, made more accurate work in this direction possible. The principle of triangulation, which will be treated more fully later, and is such an important part of the sciences, both of G. and surveying, was first applied by a Dutchman named Snell in 1615. The observations of Richer caused Huygens and Newton to think that the form of the earth was not a perfect sphere, and actual measurements of arcs were attempted. Such was the aim of the Fr. expedition under Messrs. P. Bouguer and C. M. de la Condamine, and of that under Messrs. P. L. de Maupertuis and A. C. Clairault. An International Geodetic Association has been founded, and observations

are being carried out in many parts of the world—Ecuador, Lapland, India, Japan, Egypt, etc. The system of triangulation is invariably used in G. By this means, if the dimensions of one triangle can be found with accuracy, this can be used as a base for many other calculations. There are, of course, errors in observation which cannot be avoided in all measurements, including angular arcs, and these introduce a great difficulty into the calculation of sides of a triangulation. Starting from a given base in order to get a required distance, the latter may generally be obtained in several ways, as different triangles are used and no two results will agree exactly. Experience will be a guide as to the most likely result, but no experience will be able to give any assurance of success in the case of a large network of triangles. In such cases the only way is the method of least squares, which is, however, exceedingly laborious even for the simplest cases. The usual method of triangulation is for chains of triangles to be formed in the direction of the meridian and perpendicular thereto, as in France, Spain, and Austria. In Italy, Sweden, and Norway, Germany, Russia, and the U.S.A., oblique chains of triangles are formed. Sometimes chains of consecutive plain triangles are made, and occasionally, as in India, the combination of triangles forms consecutive polygonal figures; in such cases the sides of the triangles seldom exceed 40 m. in length. The surface of Great Britain and Ireland is uniformly covered by triangulation, the sides of the triangles varying in size from 10 m. to 111 m. The largest triangle, each side of which is over 100 m. in length, has one angle at Slieve Donard in Ireland, one at Scaw Fell in Cumberland, and the third at Snowdon in Wales. The measurement of a base-line is the most important point; it is a moot point whether the advantage of having a long base line is sufficient to warrant the extra time and expense. The alternative is careful triangulation from a short base. Natural objects which stand out boldly, such as church towers, may be taken for triangulation points, or special objects in masonry or wood-work may be constructed on high ground. There are over 110 base-lines measured in Europe, of which 19 are less than 1½ m. in length; in Great Britain and Ireland there are seven, of which five have been measured by steel chains and two by compensation bars. The latter are bars, each formed of two bars, one brass, the other iron, laid parallel and united at their centres, from which

they can contract or expand freely. It is always necessary that the centre of the observing station should be marked in a permanent manner. The theodolites used in G. vary in size, the diameter of the horizontal circle varying from 10 to 36 in. At every station the theodolite must be examined to see that it is adjusted as it should be in every point. The line of collimation of the telescope must be perpendicular to its axis of rotation; the latter must be perpendicular to the vertical axis of their instrument, which in its turn must be perpendicular to the plane of the horizon. In placing a theodolite over a station which is to be used in observations, the first point to be considered is that the former rests upon a perfectly firm foundation, such as rock. When it is necessary for the theodolite to be raised above the ground for the purpose of commanding particular points two scaffolds must be built, an outer one for the observatory itself and an inner one for the instrument. It is desirable that all arcs at a station should have one point in common to which all angular measurements may be referred; this is known as the 'referring object.' On mountain tops two rectangular plates of metal are placed parallel, so that light seen between them appears as a vertical line about 10 in. width; this artificial referring object is placed from one to two miles away from the observatory. See Col. Clarke, *Geodesy*, 1880; J. H. Gore, *Geodesy*, 1891; H. Helmert, *Die mathematischen und physikalischen Theorien der höheren Geodäsie*, 1884. See SURVEYING, GEOGRAPHY, THEODOLITE, ORDANCE SURVEY, etc.

Geodorum, the name given to several species of Orchidaceæ which are found in the W. Indies; they are called earthy-scented orchids.

Geodynamics, the study of the nature and the working of the forces whereby the rocks of the earth's surface are formed and changed. This involves investigation of the relations between the interior and the surface of the earth, and a discussion of the various agencies which mould the terrestrial forms. The subject includes the effects of volcanoes, earthquakes, and other disturbances on the distribution of oceans and continents, on the outline of the coast, on the form and bottom of the ocean bed, their effects on climate, and on races of plants and animals on the earth's surface, and the interrelation of all these to one another. A vast cycle of change is presupposed and a knowledge of the present order of nature is made to provide a solution of the mysteries of the past. For con-

venience of study, the subject is divided into: (1) Hypogene or plutonic action; (2) Epigene or surface action.

The former section deals with the changes of the interior of the earth, and these are conveniently divided into:

(a) *Volcanic Action*.—This will be described in detail elsewhere, but vulcanism is one of the great forces by which the topography of the earth's surface is altered. The building up of a volcanic cone as a result of continued activity, the destruction of life and property, the alteration of hydrography through the damming of river valleys are surface phenomena, but beyond the visible effusion of lava, dust, and vapours many deep-seated changes of great importance are occurring.

(b) *Earthquakes*.—A rupture or collapse of rocks under great strain is usually the determining factor of this form of seismic disturbance, which frequently results in altered surface features.

(c) *Slow Depressions and Upheavals*.—Measurements prove that certain parts of the earth's surface are at the present day showing signs of depression. The western side of Japan has within recent times had many of its one time fields replaced by beaches and banks of shingle. S. Sweden is sinking. Parts of Britain possess submerged forests which are sometimes uncovered by a low spring tide. The North Sea is a region of but recent subsidence—recent from a geological point of view. On the other hand, old raised beaches or strand lines point to upheavals in many areas.

(d) *Mountain Making*.—The contraction on cooling of the earth's crust has resulted in complex strains which in some areas have crumpled, folded, and contorted the upper strata. The Alps and many other mountain masses are the results of great folding effects.

(e) *Metamorphism*.—The high temperature and enormous pressure existing within the earth's interior, coupled with mechanical movement, cause great alterations in the composition and structure of the constituent rocks.

2. *Epigene or Surface Action*.—This will differ from hypogene in that its cycle is relatively short and its effects are more readily visible. The most important surface agents are:

(a) *The Air*.—The atmosphere causes well-marked effects; by its transporting action the sand dune is built up and the loess area formed, and the bombardment by wind-borne particles results in extensive erosion.

(b) *Water*.—Rain acts as a solvent

and leads to the disintegration of the hardest rocks. Rivers and brooks transport solids from the higher grounds and build up immense tracts of alluvium in their lower valleys, e.g. deltas, etc. Their continued action deepens the valleys and dissects the masses of high land. Frozen water in the form of ice streams or glaciers scrapes, grinds, and tears the surface over which it flows, while the destructive mechanical action of the sea is visible everywhere.

(c) *Plants and Animals*.—These act both directly and indirectly. The former are capable of modifying climate, and their constant utilisation of CO₂ is closely linked with other existences. One important effect of animal life is seen in the building up

takable. The Arthurian legend was the most popular, and laid the foundation of an abundance of poetry and prose, becoming immortalised in Sir Thomas Malory's *Morte d'Arthur*, printed by Caxton in 1485. In addition to the *Historia Britonum*, he is supposed to have written a *Life of Merlin* in Latin verse; he also wrote *Prophecies of Merlin* before 1136, which were later added to the *Historia*.

Geoffrin, Marie Thérèse (1699–1777) a Frenchwoman, b. at Paris, who was for a time the leader of a brilliant literary salon in Paris. At an early age she married Pierre François G., a lieutenant-colonel in the National Guard, and it was not until a few years before his death in 1750 that she



RAISED BEACHES, SPITZBERGEN

of the immense coral reefs of tropical seas.

(d) *Man*.—Man enters largely into the scheme of G. His activities result in many alterations of surface features; both directly and indirectly he is increasingly controlling and modifying many of the other epigenetic agencies.

Geoffrey of Monmouth (d. 1154), Bishop of St. Asaph and author of a British history. The exact date of his birth is unknown, but it was about 1100. His first edition of the famous *Historia Britonum* was published in 1139, though the text now preserved apparently dates from 1147. According to the author, the book was a translation of a Celtic MS. which Walter, Archdeacon of Oxford, had brought from Brittany, but the probability is that it was a mixture of historical fact and tradition culled from Nennius and the author's own fertile imagination. In any case the result was immediate success, and his influence on the literature of the next hundred years was unmis-

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Geoffroy Saint-Hilaire, Etienne (1772–1844), a Fr. naturalist, b. at Etampes, in the dept. of Seine-et-Oise. From 1793–8 he was professor of zoology at the Natural History Museum in Paris, then he went to Egypt with the scientific expedition

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sent out by Napoleon Bonaparte. In 1809 he was appointed professor of zoology in the Faculty of Sciences and published a number of works on his theory of the unity of all organic composition, a subject on which he had a famous controversy with Cuvier. His works include: *Philosophie Anatomique*, 1818-20; *Sur le Principe de l'Unité de Composition 'Organique'*, 1828; and *Philosophie Zoologique*, 1830. See *Life in French* by his son (1847), and *Cuvier et Geoffroy Saint-Hilaire*, 1890, by Ducrotay de Blainville.

Geoffroy Saint-Hilaire, Isidore (1805-61), a Fr. naturalist, b. at Paris. He was the son of Etienne Geoffroy Saint-Hilaire and helped his father in his work until 1838, when he went to Bordeaux to organise a faculty of sciences, remaining there as professor of zoology. In 1844 he went to Paris as inspector-general of the University, and six years later was appointed to the post his father had previously held of professor of zoology to the Faculty of Sciences. In 1854 he founded the Acclimatisation Society in Paris, becoming the first president. He published the *Life of his father*, 1847, and many other works, which include the following: *Histoire des Anomalies de l'Organisation chez l'Homme et les Animaux*, 1832-37; *Essais de Zoologie Générale*, 1841; and *Histoire Naturelle Générale des Règnes Organiques*, 1854-62, the latter being left unfinished.

Geographical Distribution. The problem of G. D. of animals and plants over the earth's surface is of intense interest and has been the subject of close study by the scientists of modern times. The greatest impetus to such study was given by Darwin's *Origin of Species*, which overthrew the idea that each species was the result of a separate act of creation. The allied species being regarded as having a common origin, it followed that they had a common place of origin, and an explanation of how they came to inhabit the different quarters of the globe in which they are at present found necessarily involves an explanation of many unsolved problems of biology. Both flora and fauna will thrive only in the environment adapted to them, but it is found that animals and plants are absent from countries that appear quite suitable to their development. The existence of natural barriers offers some explanation of this. Thus, Australia is cut off from terrestrial communication with the rest of the world and so possesses a fauna peculiar to itself, but fossil evidence indicates that American opossums may have been related to the marsupials of Australia, and it is supposed that Antarctica was

once continuous with New Zealand, Australia, and S. America. Madagascar and Australia were probably cut off from the mainland mass in a comparatively recent geological period. Such isolated regions tend to contain specimens of the fauna which flourished before the separation. The Himalayas mark a great distinction in the fauna to the N. and S., while in Africa the Sahara desert does the same. On the other hand, the mammals of the W. Indies are practically the same as those of America, and the inference is that they have in some way migrated from the mainland. Peculiarly enough, however, the W. Indies possesses one mammal which 'belongs to an order, Insectivora, entirely absent from S. America, and to a family, Centetidae, all the other species of which inhabit Madagascar only' (Alfred Russel Wallace). Similar interesting problems are offered by the fact that the fauna of Japan more closely resembles that of the Atlantic states than of the Pacific states of N. America; that the mammals and birds of N. America approximate more to those of Europe than of S. America, that the fauna of Madagascar has much in common with the Malay Archipelago, and so on. In considering such questions, attention must be paid to the processes by which the distribution of species can take place. Natural locomotion is, of course, the usual means, and birds possess the greatest power in this respect. Apart from normal methods, however, there are other agencies at work. The wind can convey the spores and seeds of plants many hundreds of miles. Winds are also of great account in conveying insects, while birds are often blown immense distances out of their course, and the eggs of fish, frogs, etc., are often conveyed by the wind moving the surface of the water. Sea currents are an important factor in the distribution of plants and animals. Darwin (see *Origin of Species*, c. xii.) conducted a series of experiments that showed the great vitality of seeds after immersion in salt water for periods varying from 28 to 137 days, and also the power that seeds possess of floating for prolonged periods upon the surface of the water. In addition, animals are conveyed by sea currents upon such natural rafts as icebergs and icefloes, drifting trees, etc. Birds may convey seeds or insects upon their feathers or in the earth adhering to their feet, while many seeds pass uninjured through the digestive organs of birds and beasts and are thereby transported to new lands.

Distribution is, on the other hand,

prevented by many methods. Mammals migrate slowly, and mountains, deserts, and marked differences of temperature, are barriers to their distribution. Forests hinder the migrations of camels, giraffes, zebras, etc., treeless regions those of apes and monkeys. The Isthmus of Panama prevents the migration of fish that live only in warm seas. Climate also impedes dispersal, while the presence of a natural enemy has also to be taken into account. The tsetse fly, for example, prevents the introduction of horses, dogs, and cattle into a certain area in S. Africa, while another fly acts in the same way in Paraguay. The more evenly the various species are distributed over the globe the less easy it is to map out the regions they inhabit, and the less valuable are the possible deductions to be made therefrom. The cryptogams, whose spores are carried in all directions by the wind, are so widely distributed that they are usually left out of all biogeographical schemes. In the same way it is difficult to mark off fixed limits for sea animals, although attempts have been made to do so by classification into littoral, pelagic, and abyssal fauna, according as the animals inhabit the sea near the shore, the open sea, or the depths of the ocean. Again, birds, having greater power of locomotion, are more widely distributed than other mammals. North America and Asia were great centres of evolution and, as successful new species were evolved, the survivors of dying-out races were driven to the S. ends of the land masses.

Distribution of animals.—The following is the scheme of distribution of animals adopted by A. R. Wallace in his *Island Life*. It is based principally upon the distribution of land mammals, but corresponds with a considerable degree of accuracy to that of birds. It includes six divisions: (1) Palearctic region, including Europe, temperate Asia and Africa to the N. of the Sahara. (2) Ethiopian region, including Africa, S. of the Sahara, and Madagascar. (3) Oriental region, including India, S. of the Himalayas, S. China, and the Malay Islands, as far S. as the Philippines, Borneo, and Java. (4) Australian region, including Australia, New Guinea, Celebes, Lombok, and the islands of the Pacific, New Zealand being regarded as a very peculiar sub-region. (5) Nearctic region, including N. America as far as Mexico. (6) Neotropical region, including Central and S. America with the West Indies. The above scheme, though favoured by its simplicity, is nevertheless hardly sufficiently accurate. For example, it ranks the divi-

sion between the Nearctic and Palearctic regions, whose faunas have much in common, as high as that between the Australian and Neotropical, where the faunas are of quite different character. For this reason modifications of it have been advocated by Heilprin and other biologists. These systems will be found fully dealt with in Lydekker's *A Geographical History of Mammals*, 1896. The following is the system now usually adopted: (1) Arctogæic realm, divided into five regions—(a) Holarctic region, including the Palearctic and Nearctic regions of Wallace's division, with the exception of parts of Mexico and California; (b) Oriental region as in Wallace's system; (c) Ethiopian region as in Wallace's system, except Madagascar and adjacent isles which form the (d) Malagasy region; (e) the Sonoran region, embracing the N.W. parts of Mexico and Lower California. (2) The Neogæic realm, corresponding with the Neotropical region of Wallace's system. (3) The Notogæic realm, including Australasia, divided into four regions—(a) Australian region, i.e. Australia proper, Tasmania, and New Guinea; (b) Austro-Malayan region, containing the islands between New Guinea and Bali; (c) Polynesian region, containing New Zealand and certain isles of the Pacific; (d) Hawaiian region, including the Sandwich and other islands.

In the Holarctic region are found such distinctive mammals as the bear, sheep, glutton or wolverine, marmot, reindeer, beaver, bison, skunk, and raccoon. The Oriental region includes the elephant, hyena, tiger, leopard, panther, tapir, rhinoceros, monkeys, apes, crocodiles, as well as deer, cattle and pigs. The Ethiopian region includes the elephant, hippopotamus, giraffe, zebra, rhinoceros, antelope, panther, leopard, lion, gorilla, chimpanzee, and lemur; the Malagasy region is characterised by a prevalence of lemurs and by the absence of the African mammals, while the Sonoran region shows a mixture of Arctogæic and Neogæic forms. In the Neogæic realm are to be found anteaters, llamas, sloths, armadillos, tapirs, and peccaries, marmosets, opossums, alligators, crocodiles, humming-birds, etc., while there is an absence of sheep, horses, and goats. In the Notogæic realm we find in the Australian region an abundance of marsupial or pouched animals, such as the kangaroo, wallaby, etc., as well as the monotremes, which are peculiar to this region; in the Austro-Malayan region a mingling of Australian and Oriental forms, in the

Polynesian and Hawaiian regions an absence of mammals, the two latter regions being distinguished only on account of the difference of their birds. The peculiar nature of the Australian fauna, which consists of a great variety of marsupials and lacks almost all species of mammals existing in the rest of the world, has been explained by Wallace as being due to the fact that the marsupials formerly spread over the rest of the world, but were gradually displaced by later types of mammals and only managed to survive in Australasia owing to their isolation. The boundary line between the Australasian and other systems is the deep channel between the islands of Bali and Lombok, and is known as Wallace's line.

The Distribution of Plants.—The distribution of plants has been the subject of many attempts at classification, but has not yielded any scheme which is so clearly defined as that given for animal life. As early as the middle of the eighteenth century, we find the Linneans attempting to account for the distribution of plants over the surface of the globe. At the beginning of the nineteenth century Alexander von Humboldt paid great attention to the question of botanical geography, and suggested the use of distribution maps, while J. F. Schouw, a Danish botanist, enunciated a system in 1833, dividing the earth's surface into eighteen kingdoms occupied to a greater or less extent by characteristic flora. He, however, made no attempt to deal with the origin and history of the various plant forms, but regarded them rather as created to a great extent in the locality in which they are found. Some years later, Meyen divided the globe into zones, adopting lines of latitude as the zone-frontiers. His system comprised the following eight zones: (1) Equatorial, lying between 15° N. and S. latitude; (2) Tropical, extending N. and S. from the 15th parallel to the tropics of Cancer and Capricorn; (3) Sub-tropical, from the tropics to 34° N. and S. latitude; (4) Warmer Temperate, between 34° and 45° latitude; (5) Colder Temperate, between 45° and 58° latitude; (6) Sub-Arctic, from 58° N. latitude to Arctic Circle; (7) Arctic zone, from Arctic Circle to 72° N. latitude; (8) Polar zone, above 72° N. The Antarctic region was left out of account in this scheme as possessing no land flora. It was subsequently modified by the substitution of isotherms for parallels of latitude as the zone-boundaries, but was only a very general division of the earth's flora. The first zone was

characterised by palms and bananas and extremely luxuriant vegetation, the second by tree-ferns and figs, the third by myrtles and laurels, the fourth by magnolias, the fifth by forests of deciduous trees, the sixth by conifers, the seventh by dwarf birches, alders, and willows, and by lichens, the eighth by saxifrages and cryptogams.

After Meyen, De Candolle proposed a scheme of grouping plants, the main principle of which was the consideration of the amount of heat necessary for their growth. In it plants were divided into *megatherms*, *mesotherms*, and *microtherms*, according as they required a tropical, moderate, or cool temperature. This scheme had the advantage of being applicable to vertical as well as horizontal distribution, but is now obsolete. The first real step towards classifying the distribution of plants upon modern lines was, however, made by Bentham in 1869, in his presidential address to the Linnean Society. He recognised the existence of three floral realms: (1) the N., including conifers and deciduous forest trees, together with the ranunculuses, spreading over Europe, N. and Central Asia, and the greater part of N. America; (2) the Tropical, lying between the N. and S. realms and characterised by evergreen Polypetalæ and palms; (3) the Southern, containing the flora of the lower part of S. America, S. Africa, and Australasia, much more complex than the Northern realm, and broken up into many scattered flora, which also sent extensions northward across the equator into the N. realm, as exemplified by the flora of Mexico and California. Bentham's successors were led to study the question of distribution from a historical aspect, and arrived at the conclusion that the tropical flora during the Tertiary period extended far beyond its present limits. In particular De Saporta studied the fossil flora of the Eocene period in Provence, and found that it was closely akin to that of India, China, and the Philippines. These and other investigations led to a scheme of distribution based upon the state of the flora of the Tertiary period, in which Drude and Engler have specially distinguished themselves. The scheme made out by Drude is much the simpler. He distinguishes sea flora from land flora, and divides the latter into three main groupings: (1) the Boreal group, including the northern, Inner Asiatic, Mediterranean, E. Asiatic, and Central N. American sub-groups; (2) the Tropical group, including the Tropical African, E. African islands, Indian,

and Tropical American sub-groups; (3) Austral group, including the S. African, Australian, New Zealand, Andine, and Antarctic sub-groups.

Engler's system is far more complicated. He first distinguishes four main 'elements' in the flora of the Tertiary period, viz.: (1) The Arcto-Tertiary, characterised by abundance of conifers and numerous genera of trees and shrubs now common in N. America, Europe, and Extra-tropical Asia; (2) the Palæotropical, characterised by many families prevalent in the tropical parts of Africa and Asia, and by the absence of certain families found in the Arcto-Tertiary element; (3) the Neotropical or S. American, which had, according to Engler, very much the same character as the present flora of Tropical Brazil and the W. Indies; (4) the Old Oceanic, consisting of forms capable of traversing wide stretches of water and of developing upon islands.

Upon the lines of these 'elements' of Tertiary flora Engler divided the flora of the present day into four 'kingdoms,' each being further subdivided as follows: (1) Northern Extra-tropical, including the nine divisions: Arctic, Sub-Arctic, Central European, Central Asiatic, Micronesian Islands, Mediterranean, Manchu-Japanese, Pacific N. America, and Atlantic N. America; (2) Palæotropical, including the ten divisions: W. African, Afric-Arabian, Malagasy, Further Indian, Tropical Himalayan, E. Asian, Malayan, Araucanian, Polynesian, and Sandwich Islands; (3) S. American, including the five divisions: the Mexican Highlands, Tropical American, Andean, the Galapagos, and Juan Fernandez; (4) Oceanic, including the eight divisions: Antarctic S. America, New Zealand, Australian, Kerguelen, Amsterdam Islands, the Cape, Tristan d'Acunha, and St. Helena. Since Darwin drew attention to the operation of Natural Selection, it has been generally accepted until quite recently that species and genera few in number were relics of unsuccessful and moribund races. J. C. Willis, however, has given conclusive evidence that this is not necessarily the case, for just as Natural Selection requires long periods for the conclusion of its operations, long periods of time are also essential for the dispersal of new species. If natural barriers prevent this dispersal, the new species will remain local and cover only a comparatively small area. Even so, it may maintain its position without decreasing if it be well established, but any new species not adapted to the environment will be killed almost immediately by the operation

of Natural Selection. On the other hand, if no natural barriers hinder the distribution, the species, given sufficient time, will gradually spread. Thus the areas occupied by plants may give an indication of the relative ages of the species, the oldest being those which have had time to become widely distributed. Moreover, in the case of islands separated early in geological history from the mainland, birds probably were some of the most active agents of plant dispersal, but in the course of time the birds became better adapted to conditions of life on the islands and visited the mainland less frequently until at the present time birds take very little part in plant dispersal beyond the boundaries of such islands. Consequently, new species arising in such isolated positions have more limited means of dispersal and will spread very slowly, if at all.

On account of the cooling of the North, plants and animals have migrated southwards. At some time in the future a northward migration will almost certainly be evident, for as species living near the present N. temperature barriers become acclimatised, or better adapted species are evolved, these barriers will recede. The importance of time for distribution cannot be too strongly emphasised.

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Geographical Societies. The Royal

G. Society was founded in 1830; in 1831 it incorporated the African Association, and in 1834 the Palestine Association. Three medals are awarded by the Society annually to distinguished workers in geographical causes. The members meet on alternate Mondays from Nov. to June, and the Society publishes the *Geographical Journal* every month. The Society's building is in Kensington Gore, London. Other important G. societies are the *Liverpool G. Soc.*, founded in 1891, which holds meetings on alternate Mondays from Oct. to March at the Royal Institution, Colquitt Street, and is under the presidency of Lord Derby; the *Manchester G. Soc.* (founded 1884), under the patronage of the King, which holds meetings on Tuesdays from Oct. to March at 16 St. Mary's Parsonage, and publishes an annual *Journal*; the *Tyneside G. Soc.*, which meets at Connaught Hall on the Tuesdays of Oct. to March; and the *Royal Scottish G. Soc.* (founded 1884), which has for its president the Rt. Hon. Viscount Novar, and holds meetings twice a month from Nov. to March, in the big Scottish towns of Edinburgh, Glasgow, Dundee, and Aberdeen, and publishes twice each month the *Scottish Geographical Magazine*. The *Geographical Association*, with meetings in various large provincial towns of England and Wales, and an annual meeting in London, publishes a quarterly, *Geography*, and has for its Hon. Sec. Prof. H. J. Fleure, 11 Marine Terrace, Aberystwyth.

Geography is that branch of science which deals with the phenomena of the earth's surface. The early Greek concept of the earth was that of a flat disc in the shape of an ellipse bounded by an ocean river. This concept was generally held during the Homeric period. The Phœnicians were among the first people to explore unknown lands, and they navigated the whole of the Mediterranean and the Euxine, and passed through the Straits of Gibraltar into the Atlantic. They planted colonies in Asia Minor and along the shores of Africa, one of which, Carthage, founded in the ninth century B.C., was later to dispute with Rome the supremacy of the world. Certain Phœnician explorers were also reputed to have circumnavigated Africa during the seventh century B.C. Thales of Miletus is claimed as the first advocate of the spherical earth, which was afterwards adopted by the Pythagorean philosophers, mainly upon the theoretical ground that the sphere was the most perfect figure. Herodotus of Halicarnassus (b. 484 B.C.) has left us in

his *History* a complete account of the earth's surface as known in his time, when it was held to be bounded by the Atlantic on the W., the Red Sea and Indian Ocean on the S., and Persia on the E. The conquests of Alexander, however, opened up new realms to human knowledge, and the conqueror himself sent forth expeditions to survey the various regions he had subdued. About the same time, Pytheas of Massilia led an expedition into the Atlantic, through the English Channel to the North Sea, and it is reputed to have reached Thule, which is supposed to be the modern Iceland. Aristotle (384-322 B.C.) devoted considerable attention to the subject of G., and urged three reasons for holding the earth to be a sphere: (1) the tendency of all objects to fall together towards a common centre; (2) the fact that the earth's shadow upon the moon during an eclipse was circular; (3) the shifting of the horizon and appearance of new constellations during a journey from N. to S. He also extended Parmenides' idea of the earth's zones, defining the temperate zone as extending from the tropics to the Arctic Circle, though it is not clear in what sense he used the latter term. Aristotle was also aware of the connection between seas, rain, and rivers, and studied the effect of climate upon the character of the different races. Further progress in scientific G. was made by Eratosthenes (b. 276 B.C.), who was the first to use the parallels of latitude and longitude. He held the earth to be a sphere revolving in space, but to him the inhabited portions only included S. Europe, S. Asia, and N. Africa.

During the Roman empire, G. became more a question of actual description of the known world, and Strabo, at the very beginning of the Christian era, summarised all the knowledge of the earth's surface that had been acquired up to the time of Augustus. To Strabo succeeded Pliny (b. A.D. 23), who had himself travelled extensively in Germany, Gaul, Africa, and Spain, and also collected all the information he could from the work of other writers. His work, *Historia Naturalis*, contains accounts of Scandinavia, the course of the Niger, and Mount Atlas, as well as giving a clearer notion of the G. of Asia. His work was carried on by Claudius Ptolemaeus (c. A.D. 150), who verified the latitude and longitude of the principal places and corrected all estimates of distances.

During the Middle Ages the knowledge of G. was submerged in the obscurity that overspread all science,

but happily Ptolemy's works lived on in Islam. It was only when the journeys of Marco Polo (1271-95), the Venetian explorer, in the far E. had again aroused interest in the subject, and subsequent explorations had led to a knowledge of the extension of land from E. to W., that Ptolemy's works were rescued from their obscurity and retranslated into Latin by Angelus (1410). The fifteenth century saw a great impetus given to G. discovery. In 1486 Diaz discovered the Cape of Good Hope, while in 1497 Vasco da Gama doubled it and proceeded to India. In 1492 Columbus made his momentous voyage across the Atlantic and discovered America, and this feat was speedily followed by an exploration of the coasts of Africa, Asia, and America, while Magellan passed to the S. of America and succeeded in circumnavigating the globe. The rapidly accumulating mass of knowledge led to an improvement in the production of maps and to the development of the cartological side of G., the New World being first shown on Juan de la Cosa's map in 1500, while Mercator, in 1569, showed the world upon the system of projection which still bears his name. Ptolemy's work rapidly grew obsolete under such a wealth of discovery, and in 1524 Apian published his *Cosmographus Liber*, basing it upon Ptolemy's system of mathematics and measurements, while Münster followed in 1544 with *Cosmographia Universalis*, which is a descriptive work containing an account of the manners of various peoples and the different industries. The next important book on G. was published by Varenus in 1650. He treated G. as a science, dealing with the form, dimensions, and substance of the earth, the distribution of water, mountains, woods, deserts, and atmosphere, with the celestial properties, i.e. latitude and longitude, climatic zones, etc., while he gave only a secondary consideration to the human side of the science. He was not content with a mere narrative of phenomena, but sought for their explanation, and his system dominated geography for more than a century.

In the meantime, geographical discovery had progressed on all sides. During the sixteenth century endeavours were made to discover a N.W. passage to India, in which Frobisher, Hudson, and Baffin took part. In the seventeenth century the Dutchmen, Tasman and Van Diemen, discovered Australia, and in the eighteenth century Captain Cook reached New Zealand and discovered many of the Polynesian Islands.

During the same period cartology had also greatly improved owing to the use of better instruments, the introduction of the telescope, pendulum, barometer, the application of the system of triangulation, thus rendering possible the production of reliable maps. The method of showing heights by *contours* is due to Buache (1737), while *hachures* were devised by Lehman in 1799. The next important step in the history of scientific G. was made by the great German philosopher, Immanuel Kant, who lectured on physical G. at Königsberg from 1765, and dealt with the subject under the five headings of: (1) Mathematical G., including the form, size, and movements of the earth; (2) Moral G., the



customs of different races; (3) Political G., dealing with countries according to their governments; (4) Mercantile G., the G. of commerce; (5) Theological G., the study of the various religions in its geographical aspect.

The beginning of the nineteenth century led to the foundation of that branch of G. known as geophysics, due to the researches of Newton, Engler, Leibniz, Laplace, and others, upon the phenomena of gravitation, tides, and the earth's density, while geology was established by the investigations of Desmarest, Werner, and Hutton upon the nature of rocks and the shiftings due to volcanic disturbances and denudation. These researches were collated by Lyell in his *Principles of Geology*, 1830-3. Botanical G. was promoted by the works of Linnæus and the two Forsters, father and son, who accompanied Cook on his voyages and directly interested Alex. von Humboldt (1769-1859) in the study. Humboldt has many claims to be considered the greatest of all geographers.

He was a great traveller and acquired a mass of first-hand knowledge as well as doing immense work in classifying the knowledge collected by others. He showed that the forms of land exercise deciding influence upon climate and upon the plants and animals, including human races, that inhabit them. The results of his investigations were published in his great work *Kosmos* (1845-58), which remains a classical work on G. He also introduced the use of isotherms and isobars, and by directing attention to the question of vertical relief and the mean height of countries he founded the science of geographical morphology. Humboldt was almost equalled in the immensity of his labours by his contemporary Karl Ritter (1779-1859), who laid stress upon the importance of comparative G. and endeavoured to show the effect of terrestrial relief and climate upon human history. His colossal work *Vergleichende Geographie*, begun in 1817, was never completed, only Asia and a portion of Africa being dealt with. He adopted the teleological argument of Christian theologians, and endeavoured to show that the earth had been created so as to meet the needs of mankind in every respect and looked upon the arrangement of land and sea and its general configuration as instruments for guiding man along the line mapped out by Divine Providence. His bias in this direction led him to devote himself more closely to the historical aspect of G. The undue stress laid by Ritter upon the historical side was corrected by Peschel, who carried on Humboldt's work, and again brought into prominence the physical aspect of the science. His successors have more or less each presented their own personal point of view, devoting special attention to and bringing into special relief one particular aspect of the science. The evolutionary theory had necessarily a great effect upon the views of geographers, and led to the conception of the earth's origin and its gradual cooling through long geological ages, and the effect of its celestial environment upon the form assumed by land and water, thus serving to complete geographical knowledge and invest the subject with a new philosophical dignity.

During the nineteenth century the work of geographical discovery went on unabated and many expeditions were sent forth. American, English, and French expeditions under Wilkes, Ross, and D'Urville visited the Arctic seas in 1840 and led to a whole series of similar expeditions. In 1880 Baron Nordenskjöld sailed round the N. of Europe and Asia. The interior

of America was explored by Humboldt and others. Africa was penetrated by Bruce, Speke, Livingstone, Emin Pasha, and other explorers. Sturt and Eyre explored the interior of Australia, while the continent was traversed from Melbourne to the Gulf of Carpentaria in 1860 by Burke and Wills. Among explorations interesting to note is the journey of Prince Peter Kropotkin in the Trans-Baikal province of Siberia and N. Manchuria in 1864, which led to a new conception of the mountain system of Asia. In 1871, Prjevalsky commenced his exploration of Tibet, in which he was followed by many Russian, British and French explorers. The last quarter of the nineteenth century also saw many important explorations in Western China, Indo-China, and Inner Asia. Between 1894 and 1897 Sven Hedin carried out some highly interesting explorations in the Pamir region, and on the northern boundary of Tibet, while the exploration of Africa is associated with the name of Stanley. Special attention has been given to the exploration of the Arctic and Antarctic regions and to the discovery of the poles. The chief expeditions to this end were conducted by the Duke of Abruzzi, in 1899, which reached 86° 23' N. lat. by Nansen, 1893; 86° 14' N. by Andrée, a Swedish engineer, who left Spitzbergen in a balloon with two companions in 1897 and was not heard of again till 1930, when his skeleton was discovered, with those of his companions, and by Scott in 1901 towards the S. pole. Both poles have, however, now been reached, the N. by Peary in 1909, and the S. by Amundsen and Scott in 1912. In addition, mention should also be made of the deep-sea explorations that have been carried out during recent years by the British ships *Challenger* and *Discovery*, the German *Valdivia*, and the United States steamer *Albatross*. Of recent years much exploration and geographical survey work has been carried on by means of aeroplanes, while motor vehicles have been used in exploration of the Sahara (Haardt and Audouin-Dubreuil, 1923), and the Gobi desert (Andrews, 1928), etc.

From the foregoing outline of the development of geographical knowledge it will be seen that the conception of G. has greatly altered from time to time, and can indeed be hardly said to be rigidly defined at present. In general G. may be said to be the study of the phenomena of the earth's surface and of its inhabitants. It can be divided into the following branches: (1) Mathematical G., dealing with the figure and dimensions of the earth, its

position relative to other celestial bodies, its movements as a planet and the effect of such movements upon its crust; (2) Physical G., sometimes called physiography, dealing with the actual physical condition of the various portions of the earth's surface and capable of subdivisions into geomorphology or the constitution of the lithosphere, oceanography, that of the sea, and climatology, the phenomena relating to the atmosphere; (3) Biogeography, or the G. of animals (zoogeography) and of plants (phytogeography), the former including the study of mankind (anthropogeography), which is again divided into political and commercial G. according as the subject is treated from the point of view of the government or commerce of the country in question. The elucidation of the many questions involved in the foregoing divisions leads to a study of the processes by which the present situations have arisen, which is termed historical G. or palæogeography, a distinct subject from the history of G., which refers both to the history of the development of geographical ideas, a branch of the history of philosophy, and to the progress of actual geographical discovery, a branch of human history. How far these branches are to be carried is not easy to determine. Mathematical G. borders upon mechanics, geomorphology is closely allied to geology, and biogeography leads naturally to biology. Another division may be made between general G. and regional G., sometimes termed chorography, which is simply the application of geographical study to a limited area, and in its turn leads to topography, the description of a special place or locality. For fuller information relating to any of these special branches the reader is referred to the various articles and to the books mentioned in the bibliography below.

While it is thus evident that G. as a branch of knowledge is capable of progressive division into various subsections, each of which can be treated in itself, it is nevertheless necessary to point out that the tendency is rather towards unification. This is due to the influence of Peschel and Ritter in Germany, whose views have gradually made their worth felt also in England and America. While the old system of G. as taught in schools consisted simply in treating each portion of the globe with reference to its physical, political, and commercial features quite objectively without any special scheme or order, the modern system endeavours to show the immediate or underlying connection each geographical fact has with the

pupil himself. Hence it is customary to begin with those geographical features which intimately concern the pupil, such as the surroundings of the class-room, thence to deal with the immediate vicinity, and afterwards to enlarge the scope of the study until it deals with the characteristics and interrelation of the general features of the earth's surface and their influence on mankind and animal and plant life, leading on to the reasons for the distribution of mankind in



CAPTAIN COOK

town and country and to the study of geographical history. This new system of dealing with the subject has given G. a place among the highest branches of knowledge, and many universities now have special professors of G. and grant degrees in the subject.

Bibliography.—Besides the books mentioned in the foregoing article the following will also be found excellent for purposes of reference: On geographical discovery—Banbury's *History of Ancient Geography* (2 vols.), 1880; Tozer's *History of Ancient Geography*, 1897; Vivien de Sainte-Martin's *Histoire de la Géographie*, 1873; Keipert's *Manual of Ancient Geography*, 1881; O. Peschel's *Geschichte der Geographie* (2nd ed.), 1877; C. R. Beazley's *Dawn of Modern Geography* (3 vols.), 1897-1904; Gallios' *Les Géographes Allemands de la Renaissance*, 1890; Peschel's *Zeitalter der Entdeckungen*, 1858; Kretschmer's *Die Entdeckung Amerikas*, 1892, as

well as the books of travel published by the Hakluyt Society and the Story of Exploration Series edited by Dr. J. Scott Keltie. For general G. the reader is referred to Siever's *Ländekimde*, 1901; Kirchhoff's *Unser Wissen von der Erde*, 1896-9; Maltebrun's *Précis de la Géographie Universelle*, 1810-29; Elisée Reclus's *Nouvelle Géographie Universelle* (19 vols.), 1875-94, and *La Terre* (3rd ed.), 1876; Marinelli's *La Terra* (7 vols.), 1887-1902; H. R. Mills, *International Geography*; V. de Sainte-Martin's *Nouveau Dictionnaire de Géographie Universelle* (9 vols.), 1879-1900. H. Jeffery's *The Earth*, 1923; Suess, *The Face of the Earth*, 1906; Huntington and Cushing, *Principles of Human Geography*, 1924; Joly, *Surface History of the Earth*, 1925; Mackinder, *Britain and the British Seas*, 1915; Russell and Ogilvie, *Great Britain: Essays in Regional Geography* by 26 authors, 1928. For current information see *The Statesman's Year Book*, edited by M. Epstein, M.A., Ph.D., the *Almanach de Gotha* (published in French and German), and Petermann's *Mitteilungen Ergänzungshefte*, as well as the Proceedings and Journals of the various geographical societies, *Les Annales de Géographie*, *Die geographische Zeitschrift*, and the *Geographisches Jahrbuch*. On physical G., see H. R. Mill's *Realm of Nature*, 1897; W. M. Davis's *Physical Geography*, 1892; Supan's *Grundzüge der Physischen Geographie*; and de Martonne, *Traité de Géographie Physique*, 1926; on commercial G. Chisholm's *Handbook of Commercial Geography*, 1903, and U.S. Geological Survey, *World Atlas of Commercial Geology*, 1921; and on political G., G. Ratzel's *Politische Geographie*, 1903.

Geological Societies. The chief G. S. in Great Britain is the *Geological Society of London*, founded in 1807 and incorporated in 1826 (Address, Burlington House, London, W.1). Among foreign G. S. some of the principal are the *Geological Society of America* (New York), *Société Géologique de France* (Paris), *Deutsche geologische Gesellschaft* (Berlin), and the *Soc. Geol. Ital.* (Rome). International Congresses of Geology are held at intervals, the first having taken place at Bologna in 1878. Much work of a geological nature is carried out by members of crystallographical, petrological, mineralogical and palaeontographical societies, while smaller bodies (natural history societies, etc.) afford a focus for local activities.

Geological Survey. The first instituted G. S. was that of Great Britain. Its initiation was largely due to the

enlightened policy of Colonel T. F. Colby (1784-1852), director-general of the ordnance survey. In 1834 Sir Henry de la Beche, at the direction of the Ordnance Survey, produced a geological map of Devon, and in 1835 the G. S. was established. De la Beche, then foreign secretary of the Geological Society, being organiser and director. The surveys of other countries were established later, and those of the United States, Canada, Germany, and France have reached a high standard of efficiency. The survey is engaged in the collection of information regarding the geological structure of the country, the results of such work being published in the printed memoirs issued annually. Furthermore, geological maps are published, based on the information collected. As well as promoting geological science, the survey work is of great practical utility, bearing on agriculture, mining, road and railroad making, and the development of the natural resources. A museum of economic geology was established in 1837, and in 1851 the Museum of Practical Geology and the School of Mines were opened. There are now in Great Britain departments for England and Wales, Scotland, and Ireland acting under a director-general at headquarters in London, and the ordnance and geological surveys are distinct. The G. S. issues coloured geological maps on the scale of 1 in. to 1 m. (1 in 63,360), 6 in. to 1 m., and 25 in. to 1 m.; there is also a special index map on the scale of 4 m. to 1 in. Descriptions of the maps are published and the survey issues annual memoirs, in which the work done during the year is described and the report of the director is given, special reports being published regarding water supply. The United States G. S., organised in 1879 and with headquarters at Washington, D.C., is united with the topographical survey. Folios of maps are published on scales corresponding to those of Great Britain, containing topographical, orographical, economic, and geological charts. Bulletins are issued annually, and special publications are devoted to water resources. Special Agronomic or soil maps are issued (as also in Japan and Germany), and great importance is attached to the collection of photographs and materials for educational purposes. The surveys of other countries also issue annual reports, which may be purely scientific or of economic or statistical importance, while the colonial surveys issue special reports regarding the mining developments of the country. Much

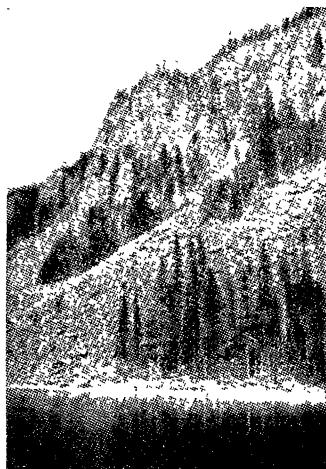
survey work is now carried on by aeroplane (e.g. for the British Ordnance Survey), O. G. S. Crawford having emphasised the fact that many features (ancient earthworks, etc.) can plainly be seen in this way even when unnoticeable to an observer on the ground. For the history of the G. S. of Great Britain, see H. B. Woodward's *History of the Geological Society*, 1907; also Sir Archibald Geikie's *Life of Murchison*, 1875, and his *Life of Sir A. Ramsay*, 1895.

Geology (Gk. γῆ, the earth, and λόγος, a discourse), the science which investigates the structure and history of the earth. It deals with the nature and origin of the rocks which form the earth's crust, and treats of the progress of our planet from its earliest beginnings down to its present condition, of the birth of oceans and continental areas, of mutations of climate, and of the appearance and disappearance of successive faunas and floras. As an inductive science G. is comparatively young, although, as the writings of Pythagoras, Strabo, and others show, from very early times, the phenomena with which it deals, claimed some attention. The belief of Oriental cosmogonies in the alternate destruction and renovation of the world, may well have been caused by the observation of the occurrence of sea shells in rocks far removed from the sea. In the tenth century, fossil shells were regarded as evidence of geographical changes, although some held that they were the result of 'plastic force' or were special creations. That they were relics of the Noachian Deluge was an idea which prevailed throughout the seventeenth and eighteenth centuries. The great philosophers on the Continent, Palissy (1580), Leibniz (1680), Moro, and Generelli (1740), and others held advanced views and had propounded theories which are now fundamental. Especially in Italy did the science progress, and in England the spread of these advanced views is shown by the publication of Michell's *Cause and Phenomena of Earthquakes*, 1760. The eminent professor of mineralogy at Freiburg, Werner, had in 1775 determined the order of succession of the strata in the Harz Mts. He maintained that his classification was applicable to the sedimentary strata of the whole world, and although this was found to be inadequate, and in some respects erroneous, it nevertheless established a definite geological principle. Werner regarded the igneous rocks as chemical precipitates, James Hutton (1788) upheld the igneous origin of these rocks, and a great controversy arose between the 'Wer-

nerites,' or 'Neptunists,' as they were termed, and the followers of Hutton, the Vulcanists. The latter held that the records of the past were only to be interpreted by understanding the methods of nature at the present. The Huttonian theory was ably expounded by John Playfair (1832) in his now famous *Illustrations*, and was also strongly supported by the experimental researches of Sir James Hall. Hutton's work had been done on the Scottish rocks, which were mainly igneous, and which, while showing excellently the effects of denudation and decay, were devoid of stratification. It was left to William Smith (1790), an English land surveyor working in the neighbourhood of Bath, to lay the foundations of stratigraphical G. Smith remarked that each group of the stratified rocks which came under his observation was characterised by its contained fossil remains. By thus establishing the fundamental geological principle, that rocks in different localities and possibly laid down under different geographical conditions, can be correlated in time by the use of fossils, Smith gained for himself the title of 'The Father of Geology.' Charles Lyell held Huttonian ideas, and his *Principles of Geology* (1830-3) is still a standard work of reference. The cry that the present is the type of all preceding ages, as far as is revealed by the fossiliferous strata, gained for his school the name Uniformitarian. The publication of Charles Darwin's *Origin of Species*, 1859, as well as affecting the palaeontological side of the science gave an evolutionary tone to the physical and stratigraphical side. The attention given to the petrographical side of G. was revived by the researches of Henry Clifton Sorby (1826-1908), who showed that much information was to be obtained from the examination of thin sections of the rocks under the microscope, and thus opened up a field of inquiry from which much has been gleaned and from which much may be expected. The several departments of G. may now be outlined.

Geognosy.—This treats of the materials of which the planet consists, and is sometimes treated under the name Petrology (q.v.), of which Petrography and Petrogenesis are the two branches. The earth consists of a globe having a cool and solid crust, but with a high internal temperature, and surrounded by two outer coverings or envelopes, an outer one of gas (atmosphere) and an inner one of water (hydrosphere). The atmosphere extends some 500 m. from the earth's surface, while the hydrosphere

with an average depth of about 14,000 ft. covers about three-fourths of the surface of the globe. The solid crust or lithosphere has a mean density of 2.7, and since the density of the earth as a whole is 5.6, the inference drawn is that the planet consists of two portions—a lighter solid crust and a heavier interior. (barysphere). The evidence for the internal heat of the globe lies in the existence of volcanoes, hot springs, and the downward increase of temperature in borings, wells, and mines. Below a zone of invariable temperature, the temperature rises on an average of 1° F. for every 60 ft. of



TALUS FORMED BY ACTION OF FROST,
NIPIGON RIVER, ONTARIO

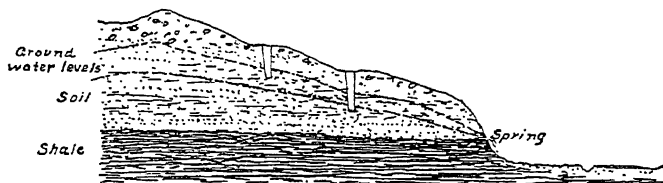
descent. Inferring this increase continuous, the most intractable bodies would become molten at a depth of 50 m., and thus the theory was held that the earth had a molten interior surrounded by a solid crust. The impossibility of this condition was shown by Prof. Hopkins of Cambridge, while Lord Kelvin showed that the earth is more rigid than a ball of steel of the same diameter, and argued that it was probably solid to the centre. The solidity of the interior is accounted for by the suggestion that fusion of the rocks by the intense heat is prevented by the enormous pressure which exists at the depth. In any event, the rigidity of the barysphere is beyond doubt, and its mean density must

clearly be greater than 5.6. There is reason to believe that it consists chiefly of a mixture of nickel and iron, though towards its periphery there may be a zone of metallic sulphides and oxides. The lithosphere down to a depth of 10 in. consists mainly of oxygen (about 47 per cent.) and silicon (about 27 per cent.), in the form of silicates, etc. The age of the earth has been estimated from the thickness of the stratified deposits. From observation of the rates of geological changes at the present, assuming them a measure of past changes, and taking the maximum thickness of the sedimentary strata to be about 530,000 ft., geologists have calculated the age of the planet to be over 500,000,000 years. Lord Kelvin from physical arguments assigned at least 100,000,000, whilst more recently, from radioactive considerations, the age has been estimated at some 2,000,000,000 years. This result has been confirmed astronomically. The rocks of the earth's crust may be sub-divided into three main groups, viz. Aqueous, Igneous, and Metamorphic. The composition of the rocks and their macroscopic and microscopic characters are treated under Petrography, while the study of Mineralogy treats of the mineral constituents.

Dynamical geology.—Geologists believe in the constancy of nature and consider that the study of the present order of nature provides a key for the interpretation of the past. Thus the records of the past action of various natural agents of change, as preserved to us in the rocks of the earth's crust, may be interpreted by the study of the operations of nature now in progress, which study constitutes dynamical G. The agencies of geological change are divided into two main groups: (i.) Epigene or Subærial, (ii) Hypogene or Subterranean. The subærial agencies may be subdivided as atmospheric, aqueous, organic, and chemical. The winds of the atmosphere are concerned in the removal from one place to another of all loose material. In this way we get the formation of sand dunes and links, and the curious clay formation 'Loess.' Changes of temperature causing alternate expansion and contraction of the rocks result in their ultimate destruction. The aqueous agencies of change are the most important of epigene agents. The rain washes away fragments of disintegrated rocks into the nearest streams. Continual weathering of the rocks by rain causes the surface of the land to be worn down, and the material transported to the seas. Rain water percolating the rocks is assisted in their

destruction by frost. The water is frozen in cracks and crevices and by the expansive force the rocks are shivered into fragments. Especially does this occur on mountain tops, giving rise to jagged peaks whose slopes are covered by a 'talus' of shivered fragments. Springs may arise from the rain which falls on previous strata, and may issue as perennial or intermittent, or as cold or thermal springs. Occasionally spring waters hold minerals in solution and may deposit the excess locally as calcareous travertine, or as siliceous sinter. Due to underground waters dissolving and wearing away the rocks, caves are formed in which we may find stalactites and stalagmites. Streams and rivers are concerned in the work of denudation by

are formed globigerina and radiolarian oozes, and the coral islands and reefs. Finally, chemical agencies are concerned in cementing loose deposits into solid rocks, in forming littoral concretes and deposits of calc-sinter, and in giving origin to mineral oils and rock salt. The hypogene agents of change are volcanoes, earthquakes, and slow crust movements. These agencies are engaged in accentuating the relief of the globe, and act antagonistically to the levelling tendency of epigene agents. The volcano piles up masses of volcanic 'ejectamenta,' the earthquake shakes entire districts, while the secular crust movements warp the crust into vast regional waves of alternate elevation and depression, or give rise to mountain ranges. Thus the two sets



UNDERGROUND WATERS

Water and rain and melting snow sink into the soil until arrested by some impermeable bed, such as clay or shale. The level of ground water rises after a wet season and sinks after a dry one, leaving shallow wells without a water supply. Springs occur along the sides of slopes where the top of the impermeable layer is exposed.

eroding their beds, transporting the material swept into them by rains and floods, and by the deposition of this material in places where the waters come to rest. Thus lakes may be silted up and deltas and alluvial flats formed. Glaciers show the work of frozen water. By carrying off rock material as 'Moraines' and by carving valleys out of rocks, they assist in the work of denudation. The waters of the sea act in three ways: by erosion, transportation, and deposition of sediment. Waves and breakers erode the shore, and this material, together with that brought down by rivers, is carried by ocean currents, and finally deposited on the ocean floor within about 200 m. of the shoreline. The organic agencies at work are those depending on plant and animal life. Plants by their growth and decay continually add to the soil and also protect the rock surface. Carbonaceous and coaly deposits are formed by plants, and also siliceous deposits, such as the diatom ooze on the ocean floor. Animals aid in the building up of the earth crust by adding their coverings or skeletons. Thus

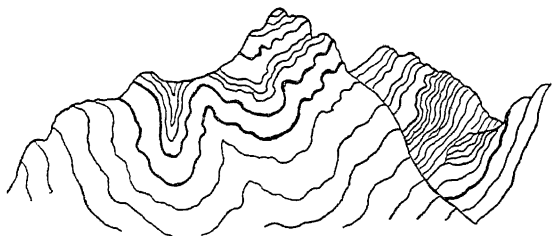
of agencies, epigene or hypogene, keep the earth in habitable equilibrium; the ruins of the lands deposited as sediments on the ocean floor by the one, being raised above the surface of the ocean by the other, to undergo the same sequence of degradation, deposition, and renewal.

Geotectonic geology deals with the structure of rock masses. Viewing first the igneous rocks, we find they are grouped as (a) extrusive, and (b) intrusive. The former type are chiefly lavas and ashes ejected near the surface. Lavas have a scoriaceous upper and lower surface, vary in thickness, and produce a certain amount of contact metamorphism on the underlying beds. Steam holes or vesicles in the lava may become filled by secondary mineral matter giving amygdaloidal structure. The ashes exuded from volcanic cones vary in coarseness from fine dust and tuff to agglomerate formed within the cone from bombs and lapilli. The intrusive types of igneous rock are newer in age than the rocks into which they are intruded, and are represented by volcanic necks, dykes, bosses, lacco-

lites, and intrusive sheets or sills. These latter differ from an extruded lava sheet in having no scorificaceous surfaces, not varying so markedly in thickness and having rocks both above and below altered by contact metamorphism. Regarding now the secondary or derivative rocks, we observe their characteristic bedding or stratification due to the method of accumulation, *i.e.* by deposition under water. Individual beds when followed are found to be wedge-shaped, *i.e.* they thin out. Followed laterally, a bed may change its character, *e.g.* limestone passes into shale, shale into sandstone, and sandstone to conglomerate. If the strata are horizontal, then the beds outcrop parallel to the contour lines. This is not always so, but the beds generally dip at a certain angle due to folding. The strike of a bed is at right angles

posited upon the denuded surface, giving rise to unconformities.

Palæontological geology deals with fossils or organic remains preserved in the rocks and endeavours to gather information from them as to the history of the earth and its inhabitants. Fossils are of great use in determining the age of strata, and given that the type fossils of a formation are known, it is possible to show the existence of any break which occurs in the stratigraphical succession, or any abnormal sequence which may occur as the result of folding. From the study of the fossils it can be shown that the progress of life forms has not advanced at the same rate in all quarters of the globe, a certain stage being reached in one place many thousands of years before it was reached in another part of the globe, although the same general



PART OF FOLDING MOUNTAIN, ATHABASCA GAP, ROCKY MOUNTAINS, SHOWING A COMPLEX SYNCLINE

to the true dip, and is designated by the compass bearing. The beds are folded into anticlines and synclines due to crust movements. In mountain regions where the tangential pressure appears to be greatest, the beds are often overfolded and inverted, giving the type of folding known as isoclinal. In the Alps and mountain chains of similar type, such as the Himalayas and the Andes, the folding and inversion is so great that a typical fan structure is developed. Jointing occurs in both sedimentary and igneous rocks, smaller joints being due to drying and contraction of sediment in the aqueous rocks, or to cooling and contraction in igneous rocks. Master joints, due to torsional stresses, traverse both igneous and aqueous rocks, when followed across country. Faulting or dislocation of the beds is also due to earth movement and pressure. Evidence goes to show that these disturbances have occurred over and over again, beds being upheaved, folded, tilted and denuded, and then being depressed, and sediment de-

succession of organic types may be found in each region. The testimony of the rocks is in favour of the doctrine of evolution, although very many discrepancies arise due to the imperfections of the Geological Record.

Historical geology.—The fossiliferous strata of the S. of England were the first strata to attract minute study. Following on his researches on these strata, and on other rocks in England and Wales, Wm. Smith published a table of the stratigraphical succession, in which the London Clay was regarded as the top series, passing downwards into the Chalk, Greensand, Oolite, Lias, New Red Sandstone, Coal Measures, Old Red Sandstone, and the Greywacké Rocks. In later years these Greywacké rocks were investigated by Murchison and Sedgwick. Sedgwick, working from the base of these old rocks, called his system the Cambrian, while Murchison, working from the base of the Old Red Sandstone, named his system the Silurian.

Later it was found that the Upper Cambrian of Sedgwick was the same as Murchison's Lower Silurian, and it was suggested by Professor Lapworth that they be grouped as Ordovician. Rocks older than Cambrian are unfossiliferous, save for the pseudo-fossil 'Eozoon Canadense,' and are termed pre-Cambrian. Several alterations were made in the upper part of Wm. Smith's classification. The newer rocks, the Tertiary, were subdivided by Lyell into Eocene, Miocene, and Pliocene, according to their percentage of living types of mollusca. Since then the groups Oligocene and Pleistocene have been added. The Old Red Sandstone below the Carboniferous system was studied and their fossil fishes described by Hugh Miller and Agassiz. The Devonian strata of Lonsdale were found to be homotaxial with the Old Red Sandstone, certain fish and crustaceans being common to the two sets of strata, and thus beds of marine and fresh-water origin were found to have been deposited during the same geological period. The 'New Red' rocks were divided, at a later date, into the Permian and the Trias. As accepted at the present day, the scheme of chronological classification is as follows:—

Quaternary or Anthropozoic	{ Recent and Pre- historic Pleistocene
Tertiary or Kainozoic	{ Pliocene Miocene Oligocene Eocene
Secondary or Mesozoic	{ Cretaceous Jurassic Triassic Permian
Primary or Palæozoic	{ Carboniferous Devonian Silurian Ordovician Cambrian
Archæan	pre-Cambrian

The Kainozoic group is sometimes divided merely into Neogene and Palæogene, while the Mesozoic and Kainozoic groups are spoken of collectively as the Neozoic, and the Palæozoic is occasionally divided into the Protozoic (Cambrian, Ordovician, and Silurian) and the Deutozoic (Devonian, Carboniferous, and Permian). This British scheme is followed in more or less detail by geologists of all countries, and formations of other lands can be arranged approximately under British types.

Petrology.—This division of the science has rapidly become one of the most important. Of its two branches, petrography deals with the

study of rocks as they are, while petrogenesis is concerned with the modes of origin of rocks. Modern petrological methods are largely chemical or physico-chemical, while microscopic examination of rock-sections is an essential part of the technique. In England the Igneous rocks have been classified according to their crystalline character into Plutonic, Hypabyssal, and Volcanic. In America, however, the rocks are classified according to their chemical composition, and is thus a quantitative classification. The nomenclature is somewhat complicated, but much may be expected from the careful analysis of the rocks. For further treatment see PETROLOGY.

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Geometric Mean, the middle of three quantities which are in geometrical progression. Thus, if a, x, b are in geometrical progression, x is the G. M. between a and b . From the definition of geometrical progression it follows that $x = \sqrt{ab}$. Similarly, if any number of quantities are in geometrical progression, all the intermediate quantities are called G. Ms. of the extreme quantities. In higher mathematics the definition is extended so that the G. M. of n quantities is the n^{th} root of the product of the quantities. Thus the G. M. of $a_1, a_2, a_3, a_4, \dots, a_n$ is $\sqrt[n]{a_1 a_2 a_3 \dots a_n}$. The G. M. of two quantities is also their mean proportional.

Geometric Progression, a series of quantities such that the ratio of any one of them to the one immediately

preceding is the same throughout the series. This ratio is called the common ratio of the series. Thus 3, 6, 12, 24 . . . etc.; 6, -2, $\frac{2}{3}$, $-\frac{2}{9}$, . . . etc., and a, ar, ar^2, ar^3, \dots etc., are series in G. P., whose common ratios are respectively 2, $-\frac{1}{3}$, and r . In the last series the n^{th} term is ar^{n-1} and the sum to n terms is $a \times \frac{1-r^n}{1-r}$.

cases where r is less than 1, it is found that the sum of an infinite number of terms of the series is the finite quantity $\frac{a}{1-r}$. A recurring decimal is

an example of such a G. P., and is hence reduced to its equivalent fraction. G. P. forms the basis on which calculations of annuities and compound interest are made.

Geometries, Finite. Name given a class of Gs., in each of which there is a finite number of elements called *points*, falling into subsets called *lines*. The mutual relations between lines and points are closely analogous to those of lines and objects in ordinary projective geometry. See Veblen and Young's *Projective Geometry*, vol. 1., 1910, vol. 2, 1913, Boston, U.S.A.

Geometry may be defined as the investigation of the properties of space.

Historical.—As the name implies, its origin may be traced to what was necessary for the measurement of land. The frequent inundations of the Nile in Egypt destroyed landmarks, and so altered the value of land that the priests were driven to invent some method for finding areas. The first known attempt to classify these results was by a priest Ahmes in his 'Rhind' papyrus, which is at present in the British Museum. Thales was the first geometer to give deductive proofs, and this work was continued by Pythagoras. Euclid (285 B.C.), though himself not so great a mathematician as some of his less known contemporaries, collected and arranged in a logical order in his *Elements* all the known theorems, and his work, with few alterations, has remained to the present day. Apollonius (247 B.C.) did much towards the investigation of the sections of a cone, and amongst those whose names stand out in the early history of the subject may also be mentioned Archytas, Plato, and Archimedes, and somewhat later Menelaus and Ptolemy, though it is probable that some famous propositions now ascribed to them were previously known. Much time of the early geometers was spent in famous problems such as the quadrature of the circle, the duplication of the cube, and the trisection of an angle. In more recent times the fur-

ther development of the subject attracted the attention of eminent mathematicians whose names are too numerous to mention here. It may be remarked that analytical methods were introduced and developed by Descartes in the fifteenth century; and as astronomy became more thoroughly studied, the geometry of spherical triangles was introduced.

The subject is best discussed under two main heads—Pure and Analytical.

PURE GEOMETRY in its turn naturally divides into two parts, Elementary and Higher.

(1) *Elementary*.—Pure geometry embraces roughly the ground covered by Euclid's *Elements*, which forms an ordinary school course in plane and solid geometry. The latter treats of the ordinary space in which we move and is termed three-dimensional. A plane is two-dimensional, the upward direction out of the plane or third dimension being lost. Similarly, a line is of one dimension, the direction sideways out of the line, in addition, being lost. A point has no dimensions. The terms length, breadth and thickness are popularly ascribed to the three dimensions. The conception of some unknown fourth dimension has occupied much attention, but that is hardly within the scope of the present discussion. It is sufficient to say that the algebraical methods of analytical geometry can be applied to some extent to problems in four dimensions. Euclid's *Elements* filled thirteen books, of which numbers VII. to X., dealing with arithmetical and irrational quantities and parts of XI., XII., XIII., dealing generally with solid geometry, are not usually read. Of the rest, Book I. deals with lines and angles, finishing with certain propositions on areas; Book II. deals entirely with the areas of squares and rectangles; Book III. with circles; Book IV. with polygons; Book V. is an introduction on proportion to Book VI., which deals with ratios. The retained parts of Books XI. and XII. deal with elementary properties of solid geometry. The whole series of propositions is based on certain assumptions and definitions. Euclid divided the assumptions into two parts. The first part contained what are now known as axioms 1 to 9; the second part, axioms 10 to 12 and the three postulates. An *axiom* may be defined as a self-evident truth, incapable of proof, which serves as a basis for future reasoning. Without some such assumptions, no geometry is possible, but there is much doubt as to exactly what may be justifiably assumed. Euclid has been criticised

for making further assumptions in his propositions which are not mentioned initially in his list, and for mixing certain axioms with his definitions. What is now the twelfth axiom, in particular, on which proof of theorems on parallel lines are based, is unsatisfactory, and in most modern editions has been replaced by what is known as Playfair's axiom, but this, though more fundamental, is still open to some objections. The present method is to divide the assumptions into axioms and *postulates*, the latter being what must be necessarily assumed in construction, but it is questionable whether this is an improvement or not.

Until the beginning of the century the selected part of Euclid's *Elements* was accepted universally in almost its original form as a school text-book, and although it is not used now, those at present in use are little more than revised editions. A few propositions have been entirely omitted, the order has been altered in places, and some new methods have been introduced. There is no doubt that the alterations constitute a definite improvement. The new methods are worthy of notice. The idea of a locus is introduced, that is, of the path of a moving point. A circle is defined as 'the figure enclosed by a line traced out by a point which moves in such a way as to be always a given distance from a certain fixed point.' The principle of applying one figure to another is extended, and the *hypothetical construction* is introduced. It is assumed as axiomatic that a perpendicular can be drawn to a line from a point within it; a finite straight line bisected at a point and an angle bisected by a straight line; whereas Euclid never used any one of these for a proof until he had found a method for its construction. The order of his propositions suffers in consequence, and some proofs are unnecessarily long. Thus Euclid, I. 5, the proposition known as the *Pons asinorum*, because its length made it a serious difficulty presented to the beginner, is now comparatively simple.

Mention in passing may be made of the method of proof known as the *Reductio ad absurdum*, which Euclid used often and is still retained. Its use occurs principally in *converse* propositions, but it is not confined to these. In such a proof what is to be proved is assumed wrong and an obvious absurdity deduced. This absurdity occurs in every case but the one to be proved, and hence the proof is established.

The solid geometry is of a very elementary nature, and is confined to a few propositions on planes and lines

(which follow at once from the methods of plane geometry), and of simple solids, including the five regular polyhedra. It is obviously impossible to deal with the propositions in detail here, and the student must be referred to the many school textbooks.

(2) *Higher pure geometry.*—On finishing the ordinary school course the student is usually introduced to

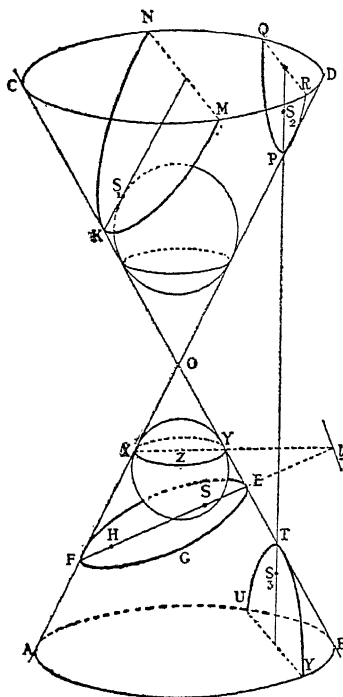


FIG. 1

the *conic section*, and though these curves are generally best treated by the methods of projective geometry, a description here is advisable. As the name implies, they are the curves obtained by cutting a right circular cone by planes. When the cutting plane makes an angle with the horizon less than that made by a generating line (AD and BC are called *generating lines*), the resulting curve is called an *ellipse* (in the figure EGF). When the cutting plane is

parallel to a generating line, the curve is a *parabola* (NKM in the figure), and when it makes a greater angle with the horizon, the curve is an *hyperbola* (QPR and UTY in the figure). It is best explained here that the geometrical conception of a cone differs from the popular conception in that it is produced on the other side of the vertex O. Hence there are always two branches of an hyperbola. A particular form of hyperbola is two straight lines when the cutting plane passes through O. Similarly, a circle is a particular case of an ellipse. A sphere may be inscribed in the cone to touch the plane of the ellipse at the point S called the *focus*, and it may be proved that any point on the ellipse is such that its distance from S is in a fixed ratio to its distance from the straight line *l* called the *directrix* (the intersection of the planes EFG and XYZ). The same is true for a second focus H, where another inscribed sphere touches the planes from below. The two foci of the hyperbola S₁ and S₂ and the one of the parabola may be similarly found, and the same properties are true for these points. Thus a conic may also be defined as the locus of a point which moves so that its distance from a fixed point bears a constant ratio to its distance from a fixed straight line, the conic being an ellipse, parabola, or hyperbola, according as the ratio is less than, equal to, or greater than unity. The point midway between the two foci of an

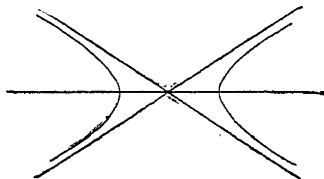


FIG. 2

ellipse or an hyperbola is called the *centre*, and these two are known as *central conics*. The extreme importance of the geometrical properties of these curves may be gathered on realising that comets, planets, and satellites move in orbits which are conic sections. Further, apart from questions of friction with the air, any body freely projected from the earth moves in a parabolic path. It may be mentioned also that as an hyperbola recedes from the centre it gradually approaches two lines known as its *asymptotes*, which pass through the centre and are tangents to the curve at points infinitely distant (Fig. 2).

Most properties of conics may be conveniently obtained by projective methods.

Projective geometry introduces many new ideas and conceptions not met with in Euclid, though it may generally be described as Euclidean. In particular Euclid never deals with infinity. Straight lines and planes in projective methods are regarded as extending to infinity, parallel lines and planes to meet at infinity, all points infinitely distant on a plane to lie on the line at infinity, and so on. These conceptions are principally due to Desargues and Gondelet. Projection itself is best explained from a figure. Let ABC (Fig. 3) be a triangle in a plane π , and O any point outside the plane. Then if OA, OB, OC are joined and produced to meet any other plane π^1 at $A', B',$ and C' , $A'B'C'$ is said to be the projection of ABC . The figures ABC and $A'B'C'$ are said to be in *perspective*, and $A, A'; B, B',$ etc., are pairs of *corresponding points*. If OAA' were to revolve about O , the points A and A' still remaining in the planes π and π^1 respectively, until it occupies a position parallel to BC , then A' will take up a definite position I^1 on the line $B'C'$ on the plane π^1 , and A will have moved off to an infinite distance on the plane π . The point I^1 is called the *vanishing point* of the line $B'C'$. In a similar way there is a line v in the plane π such that the plane of the line v and the point O is parallel to the plane π^1 . The projection of v on π^1 is infinitely distant, and v is called the *vanishing line* of the plane π . It is clearly parallel to XYZ , the intersection of the planes π and π^1 . It will be seen that $AB, A'B',$ and other pairs of corresponding lines intersect on the line of intersection of the planes. If ABC were projected from another centre O_1 into $A_1B_1C_1$, then $A'B'C'$ and $A_1B_1C_1$ are said to be *homologous*. The method of projection from a centre O is known as *central projection*, in contrast to *orthogonal projection*, where the projection of a figure on any given plane is obtained by joining the feet of the perpendiculars drawn from all points of the original figure to the plane.

Projective geometry can only be developed through properties which are capable of projection. In the ordinary way a magnitude alters by projection, and hence the great majority of Euclid's propositions which deal with magnitudes are not, in the form in which they are given at any rate, adapted to projective methods. Propositions dealing especially with the idea of magnitude are termed *metrical*, whilst those which

deal with the position of points in a figure and do not involve the idea of measurement or quantity are termed *descriptive* (all descriptive properties are projective). Certain metrical propositions, however, are capable of taking a form which enables them to be treated in projective geometry. It is necessary first to consider a new conception of magnitudes. If A and B are two points on a line, it is considered that $AB = -BA$ or $AB + BA = 0$. For three points $A, B,$ and C , $AB + BC + CA = 0$, and so on. Four points $A, B, C,$ and D on a line constitute a *range*. Lines drawn to them from some point O outside the line are called *rays*, and any number of

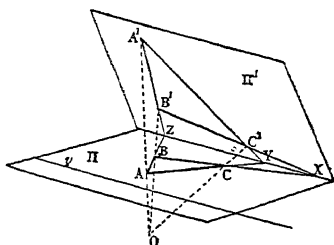


FIG. 3

rays through a point constitute a *pencil*. The ratio $\frac{AC}{BC} \div \frac{AD}{BD}$, written $(ABCD)$, is known as the *anharmonic ratio* of $A, B, C,$ and D . The four letters may be rearranged in twenty-four different ways, so that there are, twenty-four different ratios; but these are alike in sets of four, and there are only six different values, which are all connected with the original one. If $(ABCD) = \lambda$, then $(ABDC) = \frac{1}{\lambda}$, $(ACBD) = 1 - \lambda$, $(ACDB) = \frac{1}{1 - \lambda}$, $(ADCB) = \frac{\lambda}{1 - \lambda}$, and $(ADBC) = \frac{\lambda - 1}{\lambda}$. If $(ABCD) = -1$, then the range is said to be *harmonic*. From the relation $\frac{AC}{BC} = -\frac{AD}{BD}$ it may be seen that C and D divide AB internally and externally in the same ratio; as D moves further and further from the end of the line, so C moves nearer to the middle point, and in particular the middle point of AB is the *harmonic conjugate* of the point at infinity on the line AB (C and D being termed *harmonic conjugates* with reference to AB). It may easily be proved that if $A'B'C'D'$ is the projec-

tion of $ABCD$ (Fig. 4), then $(ABCD) = (A'B'C'D')$, and in particular, if $(ABCD)$ is harmonic, then $(A'B'C'D')$ is harmonic, $O(ABCD)$ as it is written is then called an harmonic pencil. Hence it is seen that those

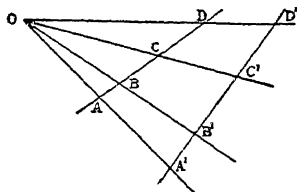


FIG. 4

metrical properties which are anharmonic are projective. From Fig. 1 it may be seen that by taking the vertex of the cone as the centre of projection, and by suitably choosing the plane of projection, a conic may be projected into a circle; hence all harmonic properties of the circle give immediately the same harmonic properties for the conic. Descriptive properties of the circle allow of the same extension.

An example will best illustrate the principle. The pencil formed by joining any number (say four) of points A, B, C , and D (Fig. 5) to any other point O on the circle is equal to the pencil $O'(ABCD)$, where O' is any other point on the circle; since the angles subtended by the arcs AB, BC, CD at O and O' are equal. Hence by projection the pencil $O(ABCD) = O'(ABCD)$ for the ellipse. In a similar way the converse proposition may be established: that if two pencils of different centres, in the same plane and not in perspective, are projective (that is, can both be obtained from one figure by projection from two dif-

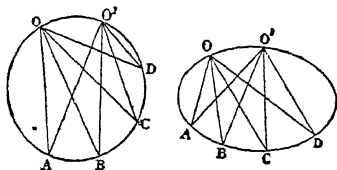


FIG. 5

ferent points), the locus of the intersection of corresponding rays is a conic section. It may also be proved that when two ranges in the same plane, not collinear and not in perspective, are projective with one

another, the lines joining corresponding points all touch a conic. The similarity between these two propositions suggests a further discussion on the *Principle of Duality*. A figure in projective geometry may be considered to be generated by a point or a straight line in a plane; and a point or a plane in three dimensions. Thus a plane curve may be the locus of a point, or the *envelope* of a straight line (that is, the line in every position touches the curve). Propositions, therefore, occur in pairs. The following are series of parallel propositions:—

Four points A, B, C and D , no three of which are collinear, are said to be the *vertices* of a *complete quadrangle*, and they may be joined in pairs by six *sides*. E, F, G are termed *diagonal points*.

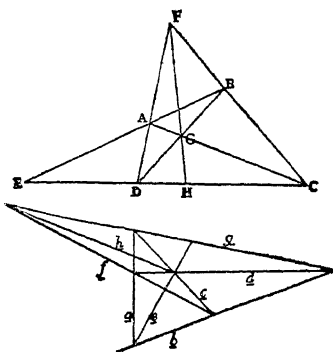


FIG. 6

It is proved that if FG intersects DC in H , then $(EHDC)$ is an harmonic range.

The three pairs of opposite sides of a complete quadrangle are cut by any transversal in three pairs of corresponding points of an *involution* (*q.v.*).

Four lines a, b, c and d , no three of which are concurrent, are said to be the *sides* of a *complete quadrilateral*, and they intersect in pairs in six points called *vertices*. e, f, g are termed *diagonal lines*.

It is proved that if h is the line joining the points of intersection of f, g , and c and h , then $(ehdc)$ forms an harmonic pencil.

The rays which join any point to the three pairs of opposite vertices of a complete quadrilateral are pairs of corresponding rays of an involution pencil.

The properties of a series of points

$A, A^1; B, B^1$, etc., on a line in *involution* are discussed elsewhere. A similar correspondence between pairs of propositions is seen in the *Theory of Pole and Polar and Reciprocation*. The polar of a point with respect to a conic may be defined as the locus of the intersection of pairs of tangents at the ends of any chord through the point. The point is called the pole, in reference to the polar. When the point is outside the conic, the polar is the chord of contact of the two tangents drawn to the conic. In the case of a circle the polar is a straight line drawn perpendicular to the radius through the inverse point (see *INVERSION*). It is proved that any line through the pole is cut harmonically by the circle and the polar, and hence poles and polars are projective. Thus all such properties for the circle follow immediately, by projection, for the conic. If a certain figure is made up of points x, y, z, \dots and lines a, b, c, \dots , the *reciprocal figure* is formed with respect to any conic, known as the *base conic*, by forming x, y, z, \dots the polars of x, y, z, \dots and A, B, C, \dots the poles of a, b, c, \dots . A curve may be the locus of a point or the envelope of a line, and the reciprocal curve will be the envelope of the polar or the locus of the pole. It is proved that a conic reciprocates into a conic, and with a circle as base conic, a conic may, in particular cases, be reciprocated into a circle. So many propositions give rise to corresponding propositions by reciprocation. Projective methods may be used in much the same way for solid geometry, but in general solid geometry is best treated by analytical methods. See Russell's *Elementary Treatise on Pure Geometry* and Durrell's *Pure Geometry*, Pt. 2. It was mentioned above that projective geometry was in some respects *non-Euclidean*. The general term *non-Euclidean* is given to those geometries which are not based on Euclid's assumptions, and those which deal with *non-Euclidean* space. Among later geometers much discussion arose over the validity of some of these assumptions, notably that dealing with parallel lines, and other alternative assumptions were made. Thus Lobatchewski substituted for it: that all lines drawn from a point may be divided into two classes, with reference to another line—intersecting and non-intersecting—and that the two classes are divided by a parallel line. The two dividing lines cut the given line on two separate points at infinity, and both made acute angle with the perpendicular to the line, and thus he developed a series of propositions. Again, it is questionable whether the

statement that a straight line is the shortest distance between two points is essentially true; there may be space beyond our conception in which it is not so; and in which, too, the angles of a triangle formed by the shortest distances joining three points are not equal to two right angles. Such space would be an example of *non-Euclidean* space. Riemann's system of *non-Euclidean* geometry commands a great deal of importance to-day in modern theories of the universe and in the theory of Relativity. It contains two fundamental conceptions, viz.: (i) that of a manifold, (ii) that of the measure of the curvature of a continuous

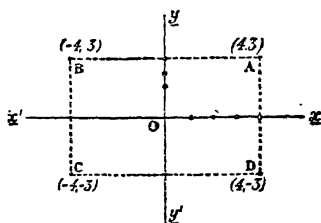


FIG. 7

manifold possessed of what he calls flatness in the smallest parts (*vide* A. N. Whitehead's *Universal Algebra*).

ANALYTICAL GEOMETRY differs from pure geometry in that problems are solved by algebraical methods. It necessarily enables solutions to be found in certain cases where the methods of pure geometry are much less convenient. This branch of the subject is also known under the heading *co-ordinate geometry*, since the position of a point is determined by its co-ordinates or distances from certain fixed axes. In its most elementary form it is familiar to most under the name *graphs*. The student first learns to plot the position of a point with reference to two fixed perpendicular axes (in plane geometry). By measuring a distance 4 units along Ox and then 3 units parallel to Oy , the point A is obtained (Fig. 7). It is said to be the point (4, 3) or the point $x = 4, y = 3$. The first of the two co-ordinates is known as the *abscissa*, and the second as the *ordinate*. If the first number is negative it is measured in direction Ox' . If the y -co-ordinate is negative, it is measured along Oy' . Hence B, C and D are respectively the points $(-4, 3), (-4, -3), (4, -3)$. Now consider the equation $3x + 4y = 12$. It is possible to find any number of

sets of value for x and y to satisfy the equation. Take each pair of values in turn and plot out the corresponding point on the graph, and it will be found that all these points lie on a straight line. $3x + 4y = 12$ is then said to be the *equation of the straight line*. In a similar way it is found that every equation of the first degree in x and y represents a straight line. It obviously follows that a set of values for x and y which satisfy two such equations at once must represent the point of intersection of the two lines. Hence the algebraical solution of two equations gives the co-ordinates of the point of intersection of the lines they represent. By similar methods the loci corresponding to equations of the second degree in x and y may be traced, and the algebraical solution of any pair of equations gives sets of values for x and y which represent the points of intersection of the loci. Such is the practical beginning of co-ordinate geometry. It may easily be established that a straight line must be represented by some equation of the first degree, that the straight line $Ax + By + C = 0$ cuts the axes in points $(-\frac{C}{A}, 0)$ and $(0, -\frac{C}{B})$, that

it makes an angle $\tan^{-1}(-\frac{A}{B})$ with the axis of x , and so on. Various formulæ are developed for the distance between two points, the distance from a point to a line, the angle between two straight lines, and so on. A corresponding list of formulæ may also be found for *oblique* axes, that is, where the original axes are taken inclined at a angle ω instead of a right angle, and the co-ordinates are measured parallel to the axes.

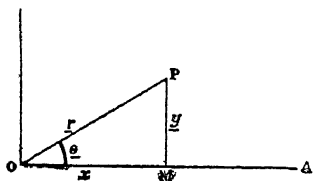


FIG. 8

The method of representing a point by its distances measured parallel to axes is known as the *Cartesian* method. Any point may also be represented by the distance OP and the angle POM, known as the *polar* co-ordinates. The connection between the two systems may easily be seen from Fig. 8 to be

$x = r \cos \theta$ and $y = r \sin \theta$, and hence the polar equation of any locus may be deduced from the Cartesian equation, and *vice versa*.

In Cartesian a circle of centre (h, k) and radius a has an equation $(x-h)^2 + (y-k)^2 = a^2$, and where the point O_1 (the *origin*) is the centre, this becomes $x^2 + y^2 = a^2$. From the locus definition of a circle its equation is found to be of the form $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ (where $a = b$ and $h = 0$; a, b, c , etc., are constants), *i.e.* of the second degree; when the axes are suitably chosen, an ellipse, parabola, and hyperbola may respectively

be represented by $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $y^2 = 4ax$,

and $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. For these equations

series of formulæ may be formed for tangents and normals at any point, the polar of a given point, and so on, and thus the geometry of conic may be treated from an algebraical point of view. Equations of the third and fourth degrees in x and y , which result in more complicated curves, may be treated in a similar way.

Mention must also be made of *homogeneous co-ordinates*, by which a point is represented by three co-ordinates with respect to a triangle, known as the triangle of reference. The method has the advantage of giving equations in symmetrical form. In *trilinears*, the co-ordinates α, β, γ are the distances from the sides of the triangle, and are connected by the relation $a\alpha + b\beta + c\gamma = 2\Delta$. In *areals* the co-ordinates x, y, z are the ratios of the perpendicular distances to the altitudes of the triangle, and are connected by the relation $x + y + z = 1$. Here also a straight line and a conic are represented by equations of the first and second degrees respectively. In *tangentials* a line is represented by three co-ordinates and a point by an equation. *Solid* geometry is in many respects analogous with plane geometry. A third axis Oz is taken perpendicular to the plane containing Ox and Oy , and a point thus has three Cartesian co-ordinates x, y and z . The equation $Ax + By + Cz + D = 0$ of the first degree now represents a plane. A straight line is the intersection of two planes, and hence is represented by two equations of the first degree. The three polar co-ordinates (r, θ, ϕ) are connected with x, y and z by the equations $x = r \cos \phi \cos \theta$, $y = r \cos \phi \sin \theta$, and $z = r \sin \phi$ (Fig. 9). In Cartesian, the equation of a sphere of centre (h, k, l) and radius a is $(x-h)^2 + (y-k)^2 + (z-l)^2 = a^2$, and when O is the centre, the equation is $x^2 + y^2 + z^2$

$=a^2$. The general equation of the second degree is a solid of which all plane sections are conics and is called a *conicoid*. A particular case is the *ellipsoid*, whose equation is $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$. From these equations formulæ for tangent planes, normals, etc., are developed very much as in plane geometry. Many solid geometry methods are, in fact, analogous with those of plane geometry, and many of the simpler surfaces may be derived from conics. Thus, surfaces of revolution are obtained by revolving some plane curve about an axis in the same plane. The *hyperboloid of two sheets* and an *elliptic paraboloid*, for example, may be generated by the motion of a variable

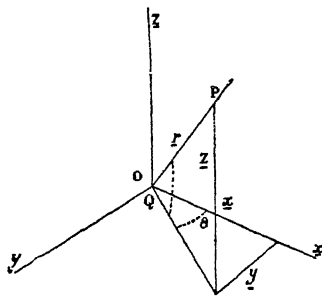


FIG. 9

ellipse and a parabola respectively, and finally the *hyperboloid of one sheet*, the *hyperbolic paraboloid*, the cone and the cylinder, and others known as *ruled surfaces* may be generated by the motion of a straight curve. A curve in space may be represented by two equations, and hence the properties of such a curve are obtained by expressing the three co-ordinates as functions of a single variable. Such a curve is treated as a polygon, whose sides are indefinitely small. The plane of any two consecutive sides does not in general contain the next consecutive side. These are called *tortuous curves*. By supposing x, y, z, w to be the four co-ordinates of a point in four dimensions, a similar series of results may be obtained. For plane analytical geometry the student may be referred to Smith's *Co-ordinate Geometry* (for elementary work), and A. Clement-Jones's *Introduction to Algebraical Geometry*; for solid geometry to Frost's *Solid Geometry* and Salmon's *Geometry of Three Dimensions*.

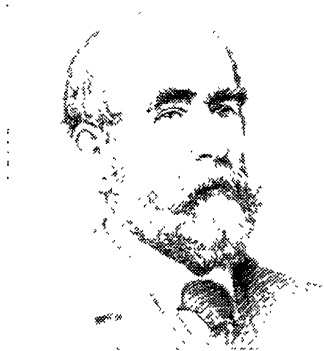
Geoponici, the name given to various Gk. and Rom. writers on agriculture, also known as *Scriptores rei rusticæ*. The Alexandrian writers were great compilers of treatises on agriculture, γεωρονικά, and they were used by later writers, such as Cassianus Bassus, who wrote at the end of the sixth century A.D. A great source from which such compilations were made was that of Mago of Carthage, frequently condensed and translated. Cato the Elder wrote a practical treatise, *De Agricultura*, of which parts survive, but the chief authorities, still full of useful advice and of inestimable value for knowledge of past systems of farming, are the *Libri Tuo Rerum Rusticarum* of M. Terentius Varro, and the *De Re Rustica* of L. J. M. Columella, from which Palladius compiled his work in the fourth century A.D.

George, Saint (d. 303), the patron saint of England, was b., according to hagiologists, in Cappadocia of a noble Christian family, became a soldier, served the Emperor Diocletian with distinction, rebuked the emperor for his persecution of Christianity, and suffered a martyr's death at Nicomedia. Eusebius (*Hist. Eccles.*, viii. 5) writes of a nameless martyr under Diocletian in Nicomedia, and a still earlier record speaks of the martyrdom of the Holy George in 225. The existence of the saint has been doubted, and Gibbon identified him with George of Laodicea, an Arian bishop of Alexandria, which in view of Eusebius' testimony is chronologically impossible. His authenticity was doubted in the early church, but the shrine of the martyr at Lydda was a place of pilgrimage to crusaders, and his fame was recognised by the Moslems. Near Lydda was the traditional site of the rescue of Andromeda from the sea-monster by Perseus, and naturally the Christian martyr absorbed the pagan legend to himself, with the story of St. G. and the Dragon, known from the sixth century and rendered famous by the *Golden Legend*. St. G., who was the patron saint of Genoa, was not adopted formally by England till the reign of Edward III.

George, David Lloyd, see LLOYD GEORGE, DAVID.

George, Henry (1839-97), an American economist, b. in Philadelphia. He left school at an early age in order to support himself, and first went to sea. He afterwards learned the trade of printing, and in 1858 worked his way to California, where he became a journeyman printer. He was, however, soon obliged to leave this trade, owing to its slackness, and for the next few years he drifted from one

employment to another. In 1865 he began to write for the Press, and became a reporter on the *San Francisco Times*, where he rapidly obtained promotion. His most important work, *Progress and Poverty*, was first published in 1879, and in a few years obtained great popularity; and, by 1883, G. found himself regarded as the apostle of a new social creed. He wrote numerous articles for magazines and papers on economic and political subjects, but his literary activities brought him little pecuniary return, and he remained in poor circumstances till his death.



HENRY GEORGE

George, Stefan, one of the greatest figures in modern Ger. literature, b. in Büdesheim in 1868. In 1892 he founded his far-famed *Die Blätter für die Kunst*, and gathered around him a band of writers who were destined to have a profound influence on Ger. letters. George, the poet, and Friedrich Gundolf, the literary critic, were the most prominent of these. They founded a school in Ger. literature. Their main point of attack was the mediocrity in latter-day Ger. literature, the slavishness to the past, the disregard of perfect form. They really preached what has been called in Germany aristocratic individualism—be yourself, but be it with distinction, with art. Nietzsche and Mallarmé were really George's literary gods. His own poetry has much of the polish, as well as the obscurity of Mallarmé. But he had a tremendous influence on all the writers who have followed him. Among his principal poetical works are *Hymns*, 1890; *The Year of the Soul*, 1897; *The Tapestry of Life and the Songs of Dream and*

Death, 1900; *Days and Deeds*, 1903; *The War*, 1917.

George of Trebizond (1395–1484), a Gk. philosopher and scholar, b. in the island of Crete, but descended from a family of Trebizond. As a scholar he was famous in connection with the revival of the study of Gk. in Italy. He became professor of rhetoric and philosophy at Venice, and gained a great reputation as a teacher and translator of Aristotle, engaging in controversy with his contemporary Gemistus Plethon, the Platonic philosopher. *Rhetorica* (1470) is among his writings. He d. in great poverty at Rome.

George I. (1660–1727), King of Great Britain and Ireland. Inherited from his father possessions which in 1692 had been made into an electorate. He married his cousin Sophia Dorothea of Zell, who in 1694 was divorced by him because of her alleged misconduct with Count Königsmark. The court of George of Hanover was, as was usual in the days of the late seventeenth century, profligate and immoral, but Dorothea of Zell paid the penalty of her infidelity by life-long imprisonment. The mother of G. was Sophia, the grand-daughter of James I., and although the possibility of succession to the English throne seemed remote, the question of Protestant succession gave the succession to the Hanoverian line by the Act of Settlement, 1702. During the war of the Spanish Succession G. sent forces to the allies at Blenheim and made a strong alliance with Marlborough. Realising the importance of the crown of England, he persisted in keeping on very friendly terms with the Whigs. In 1714 the death of his mother (Sophia) and of Queen Anne laid the way open for his succession to the English crown. The intrigues of Bolingbroke were unsuccessful, owing to the sudden death of the queen. G. was proclaimed. He came immediately to England. His succession may be regarded as the final step in the Protestant Revolution, and the stability of his crown may be gauged from the utter failure of the Jacobite rebellion of 1715. His accession was important from many points of view. In the first place, he understood no English, his ministers did not understand Ger., hence his presence at cabinet meetings was futile. Accordingly he stayed away, and the power passed into the hands of a Prime Minister (Walpole). Secondly, he insisted upon choosing his ministers from the ranks of the Whig party. He did not realise the importance (as had William III.) of being entirely independent of party politics; thus he pre-

pared the way for the rule of the Whig oligarchy, which was only overthrown by his great-grandson George III. Thirdly, he regarded England merely as a great country of which he was the nominal ruler and which was to raise the prestige of Hanover and fill his pockets and the pockets of his Ger. followers with English gold. He was not, however, by any means devoid of power. The great event of his reign was the bursting of the South Sea Bubble, which gave Eng. commerce a great shock, but produced also the greatest of our peace ministers. Walpole. George died one year after his unhappy wife, whilst travelling to Hanover.

George II. (1683-1760), King of Great Britain and Ireland, the only son of George I. In 1705 he married Wilhelmina Caroline of Anspach. In the following year he was created Earl of Cambridge, and in 1708 he was present at the battle of Oudenarde. During his father's reign he was on bad terms with the sovereign during the greater part of the time. Bad feeling between father and son seems to have been one of the Hanoverian hereditary qualities. During the greater part of the reign of George I. he was regarded as the official centre of the opposition, and Walpole certainly expected dismissal when George I. died. Probably, had it not been for the influence of Caroline of Anspach, Walpole would have been dismissed, but Caroline pointed out the ineptitude of the candidate whom G. had selected, and Walpole continued in office, receiving the loyal support of the king until his resignation. G. was a man with the character and habits of a drill sergeant. He was a man of method, very economical, and with a prodigious memory. He was stubborn and very obstinate at times, but when he realised that the influence which was brought to bear upon him was that of a greater and wiser mind than his own, he submitted to it quite easily, and it is to his credit that he was, in spite of his qualities to the contrary, capable of recognising this. The politics of the greater part of his reign were quiet. Walpole, with his policy of 'let sleeping dogs lie,' and his ability of reducing corruption to a fine art, gave the country a much-needed peace, but, at the same time, by his methods and by his inability to work with capable men, raised up an opposition. In 1737 Caroline died, and, with her influence removed, matters became much more difficult for Walpole. The War of the Austrian Succession led to his resignation in 1742, and the policy of the war itself was directed

by the king and cabinet purely from the Hanoverian point of view, without any consultation of the people of England. G., like his father, recognised Hanover as the dearer of his two possessions. That G. did not lack in military skill or in courage is obvious from his presence and victory at Dettingen (1743). The importance of the reign lies to a very great extent in the facts that G. realised that he must play the part of a constitutional monarch, and that it was not possible to change his ministers and policies at will. Secondly, the rebellion of 1745 proved that personal loyalty to the Hanoverian succession was not yet a factor in practical politics, and that the Protestant Ger. succession was to a very great extent regarded as a business transaction. The traditional bad feeling between the king and the heir-apparent was maintained by the conduct of G. and Frederick, Prince of Wales (*d.* 1751). G. himself died in the middle of the Seven Years' War.

George III. (George Frederick William), son of Frederick, Prince of Wales, and grandson of George II., whom he succeeded in 1760. He was *b.* on June 4, 1738. After the death of his father he was educated chiefly under the care of the Dowager Princess of Wales (his mother) and the Earl of Bute (*q.v.*). The lines of his education decided his policy as a king, and he was educated chiefly, at least in policy, on the lines of the *Patriot King*, a book written by Bolingbroke. During the period which had followed the accession of George I. the political power of the country had passed into the hands of the Whigs. The Whig oligarchy had been everywhere supreme. By the great Whig families the policy of England was dictated. This had to a large extent been the result of the policy adopted by George I. G. was imbued with the idea that the great work of his life must be the overthrow of this power and the re-establishment of the power of the crown. During the reign of George II. the power of the crown had been relegated to a very distant position, but at the same time the power of the Whig oligarchy had also received some very shrewd blows. The power of William Pitt had been a very hard morsel for the Whig magnates to swallow; that they had swallowed showed that their power was obviously not as great as it had been. The work, then, of G. may be briefly stated as being the restoration of the power of the crown through the influence of the crown, and the overthrow of the power of the Whig oligarchy, which was to be replaced by the party of the King's Friends. The

earliest phase of the struggle resolved itself into a contest between the great Whig families, between whom had sprung up a strong sense of rivalry. The king looked on from behind, and, whilst striving to attain his desire, at the same time held back until such time as he could associate himself and his party with some phase of national life upon which party feeling was strong. He endeavoured to regulate affairs by means of the party known as the King's Friends, and also his earlier attempts to choose his own ministers and ministry must not be overlooked. His first choice, the Earl of Bute, was unfortunate, but Bute retired early in 1763, and did

colonies were in the wrong, and he fought right to the end: he was the last to give in to the opening of the negotiations for peace.

During the American struggle the constitutional struggle had gone on at home. The king had insisted upon the retention of office by Lord North; only when the surrender of Yorktown drove even Lord North to resign did he send for the Whig, Lord Rockingham. The peace of Versailles (1763) gave America her independence, but gave England better terms than had at one time seemed possible, since the victories of Rodney and the French and Spanish failures had strengthened her hand. The whole struggle, however is illustrative of the fact that England was plunged into a world war, in which she lost a great deal of her prestige, simply because of the obstinacy of a king working on apparently constitutional lines through his parliament. Rockingham died in 1783, and was succeeded by Lord Shelburne, whose short-lived ministry was overthrown by a coalition of Fox and North. The coalition ministry took office only in turn to be dismissed when their India Bill was rejected by the Lords. The king sent for William Pitt, and the famous son of a famous father became the Prime Minister. On the surface, at any rate, the king had triumphed; he had overthrown the coalition and he had appointed his own minister: the influence of the crown was apparently restored. The means employed by the king to bring about this end were, however, questionable; the coalition had been overthrown in the House of Lords solely by means of the influence of the crown. The king had intimidated through Lord Temple that any peer voting for the India Bill would be regarded as a personal enemy of the king. Pitt, without a majority of the House of Commons to support him, had been appointed minister, and was supported by the influence of the crown until finally, two months later, a dissolution and general election returned a majority in favour of the king and his minister. The dissolution was the work of the crown entirely, but the country supported the king and Pitt, and from the moment that a majority of the House of Commons gave their adherence to Pitt it may be said that his period of office became really constitutional. Of the king's personal popularity in the country there can be no possible question. In 1788 he became ill and his mind gave way. During this period of insanity the regency question was debated in the House of Commons, and Pitt was probably only saved from dismissal by the re-



GEORGE III.

not again return to office. The American question, leading to the War of Independence, gave the king an opportunity which was not to be overlooked. The king was probably honest in his inability to see anything unconstitutional in the attitude which he adopted towards the American colonists. In this he was very largely at one with the nation; the nation as a whole was just as mistaken as G. Why the Americans should not contribute to the cost of a war which had been fought in their defence, and why it was unconstitutional for parliament to levy taxes on the American colonies, were two points which the king and the nation could not understand. The king chose his own minister (Lord North) and plunged into the war, believing that it was a justifiable one, really certainly never entertaining any doubt but that the result would be as worthy. The disasters of the war but left him unmoved; the coalition of on all, Spain, and America failed to him. His eyes to the danger. As he works if said at a later period, he of the the American colonies because Life believed that the American

covery of the king. The thanksgiving service which the king attended in 1789 was one great ovation for the king himself, and the outbreak of the Revolution in France did much to increase his popularity. He was regarded as the centre of all opposition to the French and to the ideals which the Revolutionists put forward. Probably the quietness of his home life and the purity of his family life had much to do with his popularity, but above everything it must be remembered that when G. was obstinate he usually had the nation behind him. The next great question which arose was the question of Catholic emancipation. The Act of Union had been accompanied by a promise of relief to the Catholics. Pitt's proposals were brought to the ears of the king, and he rejected them entirely. He averred that his honour and his coronation oath were at stake. Pitt, rather than force his proposals on the king, resigned, but the attitude of the king was approved and supported by the vast majority of the nation. Addington, a man of mediocre abilities, succeeded Pitt, and retained office until the outbreak of war, when Pitt again came into office. The king's mind was again for a season unhinged, and the attacks now became more and more recurrent. The ministry of Pitt had included no one of outstanding ability save Pitt himself; he had proposed the inclusion of Fox, but the king declined him for personal reasons. The death of Pitt, however, changed the situation, and the king accepted Fox in the ministry of 'All the Talents.' A mild form of Catholic emancipation was proposed but rejected by the king, who demanded a promise that the question should not again be raised during the reign. The promise was not given, and the ministry was turned out of office. The Duke of Portland succeeded as Prime Minister, and was himself replaced later by Perceval to be the real leader of the ministry. The reign may definitely be taken as closing in 1811, when the king's reason finally failed him. He lived on for nine years blind and insane. To his people, G. was always a most popular king. He had said at the beginning of his reign that he gloried in the name of Briton, and it is because his good and bad qualities were so essentially English that he achieved the success that he did. He was above all things a typical Englishman of the time, a man with all the prejudices and virtues of the English nation of the eighteenth century. He married in 1761 Charlotte Sophia of Mecklenburg-Strelitz, and had nine sons and six daughters. The

death of his youngest daughter, the Princess Amelie, in 1810, brought on the final attack of insanity from which he never recovered. His eldest son, George, was appointed regent until his father's death in 1820.

George IV. (**George Augustus Frederick**) (1762-1830), King of Great Britain and Ireland, was the eldest son of George III., and was b. at St. James's Palace on Aug. 12. He grew up to be exceedingly well gifted and of exceptionally handsome appearance. The strictness and the seclusion of his home life helped to drive him to a life of extravagance and profligacy, and he plunged heavily into the gay life of London society. His first mistress was the actress, Mary Robinson. Gradually he became more and more estranged from the king, the wildness of his life and his political associates, Fox and Sheridan, both Whigs, helping to widen the breach. In 1783, having come of age, he was given a separate establishment at Carlton House, his debts were paid, and he was granted £50,000 per annum from the Civil List. Shortly after his coming of age he became madly in love with a beautiful widow, Maria Fitzherbert, who came of a good Shropshire family and who had been married twice before she met the prince. She was a Catholic, and marriage with her was impossible under the Act of Settlement of 1689, and further, the Royal Marriage Act of 1772 forbade any marriage without the knowledge of the king. She refused to contemplate becoming the mistress of G., and finally, in 1785, they were married by a clergyman of the English Church. This marriage was acknowledged secretly by his friends and denied openly for political reasons. Their relations were broken off in 1794, and again renewed in 1800, and she remained his wife in name until 1811. By the relations of the prince she was always regarded as his wife, although not acknowledged so. In 1795 the prince, having broken off relations with Mrs. Fitzherbert, was married to a German Protestant princess, Princess Caroline of Brunswick. His treatment of his wife was unjustifiable and cruel, and after the birth of the Princess Charlotte, their only child, they were separated. The position of the prince was peculiarly important in view of his father's disease. He and his friends claimed that he had the right of becoming regent without the consent of parliament, but the Regency Bill only provided for his appointment with certain restrictions. In 1811 he became Prince Regent, and continued in that office until the end of the reign. His treatment of his

wife, his extravagance, and his loose living, especially at a time of almost universal distress, made him exceedingly unpopular in the country. His appearance in the streets of London was a sign for the outburst of hisings, and in 1817 he was stoned on his way to open parliament. In 1820 he succeeded his father, and immediately there arose the great trouble with his discarded wife. She, her name left out of the Prayer Book, her title withheld, and her honour doubted, came to England to enforce her claims. Already the king had tried to divorce her, now she was accused of adultery, and a Bill of Pains and Penalties was passed hurriedly by ever-decreasing majorities. Her cause was warmly espoused by the nation, who held that even were the charges true, the life of the king was not such as to justify him in making any charges. The disowned queen tried to force her way into the Abbey during the coronation proceedings, failed, and retired to die in the Aug. of 1821. The king visited Ireland and Scotland during the early days of his reign, and his popularity there was much greater than it was in England. He attempted in a feeble way to continue the policy of royal influence, but was forced to give in. He hated Canning, but was compelled by circumstances to accept him as a minister, and later as Prime Minister. He also later strove to oppose Catholic emancipation, but again he was compelled to give in, and the Bill passed in 1829. In the following year G. died. He was a bad king, and was detested in the country. He had all the vices of the society of the time, and practically every vice he carried to excess. His only child, the Princess Charlotte, died in 1817. She had married Leopold of Saxe-Coburg in the previous year.

George V. (George Frederick Ernest Albert), King of Great Britain, Ireland, and the British Dominions beyond the Seas, Emperor of India; second son of King Edward VII., was b. June 3, 1863, at Marlborough House. In 1877 he and his brother the Duke of Clarence became naval cadets. Two years later they cruised to the W. Indies in H.M.S. *Bacchante*, and in the following year they made a more prolonged cruise in the same ship. Prince George was intended to remain in the naval service; for that reason he was appointed to H.M.S. *Canada* in the N. American and W. Indian station, and became a sub-lieutenant. In 1885, after a course at the Royal Naval College at Greenwich, he became a lieutenant; and in 1889 he commanded a torpedo boat in the naval manoeuvres.

In 1890 he commanded the gunboat H.M.S. *Thrush*; and in 1892 he relinquished his commission in the navy on becoming heir apparent through the death of the Duke of Clarence. In 1892 he was created Duke of York; on July 6, 1893, he married the Princess Victoria Mary of Teck. The Duke and Duchess visited the Commonwealth of Australia in 1901. They visited during the return journey S. Africa and Canada. In Nov. 1901, the Duke was created Prince of Wales. He succeeded his father May 6, 1910, as George V. He was crowned June 22, 1911; and at the end of that year



[Topical Press

H.M. KING GEORGE V.

he visited India, being the first British emperor to do so. At his Durbar at Delhi, the transference of the Indian capital to that place was announced. In July 1914 he called a conference at Buckingham Palace of all British and Irish parties to attempt settlement of the Ulster difficulty. During the Great War he frequently visited the Western Front. On July 17, 1917, he proclaimed an alteration in the style of the royal house: in future to be known as 'of Windsor'—all Ger. titles having been renounced. Immediately after the Armistice he made several triumphal progresses through London; and he attended service in St. Paul's. In Nov. and

Dec. he visited Paris and the battlefields; in Dec. he entertained President Wilson in Buckingham Palace. On June 22, 1921, at Belfast, he inaugurated the parliament of N. Ireland. He visited Belgium again in May, 1922; in May 1923, he visited Rome and was received by the Pope. In April 1924 he opened the British Empire Exhibition at Wembley; on July 19 of same year he was present at the consecration of Liverpool cathedral. In the spring of 1925 he was absent from the kingdom several weeks, on a health-cruise in the Mediterranean; on May 9 he re-opened the Exhibition at Wembley. At the end of Nov. 1928 he fell ill of pleurisy, underwent an operation, and was in a state so serious that councillors of state were nominated, and all members of the royal family summoned to Buckingham Palace; but he made recovery, and in Feb. 1929 was able to go to Bognor to recuperate. He did not resume opening parliament in person until Oct. 28, 1930. He has had five sons (one, John, dead) and one daughter; the eldest son, Edward (q.v.), was created Prince of Wales, 1910.

George V., King of Hanover (1851-66), only son of Ernest Augustus, King of Hanover and Duke of Cumberland, and grandson of George III. of England, *b.* in Berlin, May 27, 1819. When still quite a child he lost the sight of one eye, and an accident which occurred in 1833 resulted in his being totally blind. He succeeded to the throne in Nov. 1851. Imbued from his earliest childhood with a belief in the divine right of kings, coupled with strong religious views, he was soon in conflict with his Landtag or parliament, his blindness making him an easy prey to unscrupulous and disloyal advisers. When German affairs reached a crisis in 1866 he was unable to meet the situation. Against the advice of his parliament he refused Prussia's demand that Hanover should maintain an unarmed neutrality while the war lasted, and immediate occupation by Prussia followed; his army was compelled to surrender and the result was the formal annexation of Hanover by Prussia, Sept. 1866. The king made many unavailing attempts at restoration, but was never reconciled to Prussia. He retired to Gmünden in Austria, and died while on a visit to Paris in 1878. His remains are buried in St. George's Chapel, Windsor. He married (Feb. 1843) Marie, daughter of Joseph, Duke of Saxe-Attenburg, and left a son Ernest Augustus, Duke of Cumberland, and two daughters.

George I. (1845-1913), King of the

Hellenes, *b.* at Copenhagen, the second son of King Christian IV. of Denmark, and brother of Queen Alexandra of Great Britain. On the throne falling vacant at the expulsion of King Otto in 1862, he was recognised by the powers and elected King of the Hellenes in 1863. It was shortly after this that Christian IV. became King of Denmark, and on becoming King of Greece, G. signed an act resigning his right of succession to the throne of Denmark, in favour of his younger brother, Prince Waldemar. The Greeks accorded him an enthusiastic welcome, and he ruled in strict accordance with constitutional principles, adopting as his motto, 'My strength is the love of my people.' He was one of the principal artificers of the Balkan League, consummated in 1912, and directed against Turkey. He died by the hand of an assassin (a Greek named Alexander Skinas), on March 18, 1913, while walking in the streets of Salonika, a city then in the occupation of the victorious Greek army. He married the Grand-duchess Olga of Russia in 1867, and the result of this union was five sons and one daughter.

George II., sometime King of the Hellenes; *b.* July 20, 1890, at Tatoi near Athens; eldest son of King Constantine, on whose first deposition he was excluded from succession: his younger brother Alexander succeeding. Alexander dying in 1920, and the restored Constantine being again deposed, G. succeeded Sept. 28, 1922. Disputes with Italy, culminating in bombardment of Corfu, marked his brief reign; which ended in proclamation of a republic—G. being deposed and banished March 25, 1924.

George Friederich August (1832-1904), King of Saxony, *b.* at Dresden, the youngest son of King John of Saxony. He received a careful military training and entered the active army as a lieutenant of artillery in 1846. His name is inseparably associated with the Austro-Prussian War of 1866, and during the campaign he distinguished himself by his military ability and intrepidity. He succeeded his brother Albert on the throne of Saxony in 1902.

George, Lake: (1) A lake in the E. part of the state of New York, U.S.A., in the Adirondack Mts., connected with Lake Champlain by Ticonderoga Creek, famed for its beautiful scenery, which makes it a favourite summer resort. It is about 34 m. long, and from 2 to 4 m. wide, and is fed by brooks and springs. (2) A lake in New South Wales, Australia, 25 m. S.W. of Goulburn. It is a salt water lake, 25 m. long and 8 m.

broad, and is 2129 ft. above the level of the sea. (3) A port in Cape Colony, S. Africa, pop. 3506. (4) A lake in Central Africa, formerly known as Albert Edward Nyanza.

Georgetown : (1) A tn., now included within the limits of Washington, but formerly in the district of Columbia. Many famous people have lived here, amongst them being Francis Scott Key, J. H. Payne and J. M. Mason. It was settled in the latter part of the seventeenth century, chartered in 1789 and annexed to Washington in 1878. In the early days it was an important social centre. It has a number of large flour mills. (2) The cap. of British Guiana and its chief port, situated on the Demerara R. The city is well-built on low, flat land, and most of the houses are made of wood. It has an active trade, the chief exports being sugar, coffee, and rum. There are two foundries, a dry dock, and factories for the manufacture of rice, cigars, chocolate, candles, aerated water, ice, etc. Experimental work is carried on in the growth of rice, cotton, sugar-cane, etc. It is connected by rail and ferry with New Amsterdam and the W. coast, and by steamer with the coastal districts and rivers. Owing to the swampy nature of the surrounding district, the climate is somewhat unhealthy, though it has much improved of late years. Artesian wells supply the city with water. Pop. 57,400. (3) A municipality in Penang Island, off the W. coast of the Malay Peninsula. Next to Singapore, G. is the chief port of the Straits Settlements. It is fortified by forts and has a large harbour. Pop. (1924) 316,000. (4) A tn. in Cape Colony, off the Cape of Good Hope, laid out in accordance with the ancient Dutch modelling. (5) A city and the co. seat of G. co., S. Carolina, U.S.A. It is a seaport of some importance, and has steamship communication with New York. It is served by the Seaboard Airline railway and by steamer services. It has turpentine distilleries, and exports rice, cotton, fish, lumber, etc. G. is famous as the landing-place of Lafayette on his first visit to the United States, and the town was settled about 1700, incorporated in 1805, and chartered as a city in 1895. Pop. 5082.

Georgia (or Sakartvêlo), a former kingdom of Transcaucasia, which existed historically for more than 2000 years, comprising the territory S. of the Caucasian Mountains, between the Black and Caspian Seas. Its native and earliest name was Karthveli; Vrastan is the Armenian name,

and Gruzia the Russian. Prior to the Great War G. was divided into the Russian governments of Tiflis, Kutais, Elizabethpol, Baku, and Erivan. G. was conquered by Alexander the Great, but after his death the Georgians succeeded in establishing themselves as an independent people with a government of their own, and they managed to maintain their political position as a state until the beginning of the nineteenth century, in spite of being conquered and made tributary several times by the Arabian caliphs, and by Persia. In 1801 G. was converted into a Russian province. Many of the Georgians are at the present day Mohammedans, though they were converted to Christianity early in the fourth century (A.D. 318). Their language forms a very interesting intermediate link between the Indo-European languages and the monosyllabic tongues of Eastern Asia. It resembles them chiefly in its phonetic system and presents great facilities for composition, the laws of which are very regular. Georgian is written in a native alphabet, obviously based on the Armenian, and there are several varieties of the language. The Georgian translation of the Bible dates from the eighth century, and is the most ancient work known to exist in the language. The curious poem entitled *The Man Clothed in the Panther's Skin*, attributed to Rustavel, who lived during the eleventh century, is the next most important composition, whilst others of note are national epics and prose romances. Other than these, the great bulk of Georgian literature consists of ecclesiastical writings, national codes and chronicles, and hymns, both sacred and profane. The Georgians proper number about 400,000, and together with the highland Georgians (consisting of the Khevsurs, Pshavs, and Tushes), Imeritians, Gurians, Mingrelians, Lazes, etc., they make up a total of about 1,400,000. Their race is distinguished by some excellent qualities, and they are specially noted for great personal courage and a passionate love of music. Physically, they are a fine athletic race, and their women are noted for their beauty. Before their incorporation with the Russian empire, the social organisation rested on a highly aristocratic basis, but these relations have now become modified to a considerable extent, and a more sharply defined middle-class of merchants, artisans, and traders has been developed. The power of life and death, formerly freely exercised by the nobles over their serfs, has also been abolished.

Under the tsars G. was divided between the provinces of Tiflis and Kutais. After the 1917 revolution civil war prevailed until 1921, when G. became an Autonomous Socialist Soviet Republic in the Transcaucasian Federation. The mass of the population is illiterate and agriculture is the chief occupation. Cotton and tobacco are grown, also bamboo and medicinal plants. The cultivation of tea has increased of late. The problem of irrigation is very difficult. The country is heavily timbered, but the industry is little developed owing to the lack of communications and the unsuitability of the streams for floating the logs. The chief mineral product is manganese; coal of poor quality is mined, and naphtha exists—mineral springs are numerous. The chief industries are tobacco, leather, and bricks, also the weaving of carpets and silks. The railway lines in G. extend to 570 miles; a line along the Black Sea coast is in process of construction. The capital is Tiflis. Area, 39,000 sq. m. Pop. (including Armenians, Russians, Tartars, etc.) (1926) 2,661,000.

Georgia. One of the original thirteen of the U.S.A. It is a S. Atlantic state, bounded on the N. by Tennessee and N. Carolina, on the E. by S. Carolina and the Atlantic Ocean, on the S. by Florida, and on the W. by Alabama. The total area is 58,725 sq. m., of which 540 sq. m. are water. The surface of the state is divided between highlands and lowlands, the Blue Ridge mountains terminating in the northern part of the state. Its drainage system is extensive, the principal rivers being the Savannah, the Altamaha, the Chattahoochee, and the Flint. The climate of G. shows a wide range of temperature, and differs considerably in the various localities. In southern G. the climate is similar to that of northern Florida. The winters and summers are, however, free from extremes, and on the whole the climate is temperate. The greatest rainfall occurs in the extreme N., and the smallest in the E. G. is also notable for its variety of soils. In the northern part sands and clay predominate, but in the extreme N.W. the soil possesses great fertility, being of a loamy character. By far the greatest variety is found in the Coastal Plain Region; here abound red clay, grey sandy soils, and a sub-soil of yellow loam. The flora and fauna of G. have no distinctive features, but in mineral resources it shows as great a variety as in its climate and soils. The most important of these is stone. The marble industry, too, has steadily

grown in importance during the past years, and the G. marble has gained a reputation all over the United States. Other mineral products are: silver, copper, asbestos, talc, mica, slate, limestone, cement, etc. Coal is not extensively found, but in 1908 the value of the coal mined was stated to be \$364,279. Gold was found in White County in 1829, and even diamonds have been discovered, though not exploited. The fisheries of G. are important, oysters and shad constituting the bulk of the catch. The leading industry of the state used to be agriculture. The products are extremely diversified, and with the exception of the tropical fruits of California and Florida, G. can cultivate almost everything produced by the United States. The principal cereals grown are corn, wheat, oats, and rice. G. ranks second among the cotton-growing commonwealths, and has an enormous cotton-growing area. The growth of sugar-cane is increasing. The chief industry is cotton goods; others are lumber, fertiliser, food products, printing and publishing. Manufacturing has now passed agriculture in importance owing to the vast development of water-power. Since 1916 education has been compulsory. There are elementary schools, high schools, and normal schools, with separate schools for whites and negroes. The capital is Atlanta and the chief port Savannah. G. was the last of the English colonies to be established in America, and is called after George II. of Great Britain. It was founded by Oglethorpe as a refuge for poor debtors. She took an important part in the Revolutionary war. In 1861 she passed the ordinance of secession and in 1870 was re-admitted into the Union. Pop. 2,908,506. Principal cities are: Atlanta, 270,366; Savannah, 85,024; Augusta, 60,342; Macon, 53,829; Columbus, 43,131.

Georgia, Gulf of. This strait separates Vancouver Island from British Columbia; it is 30 m. broad and about 250 m. long. It meets the Pacific Ocean at Queen Charlotte's Sound on the N. and Juan de Fuca Strait on the S.

Georgian Bay constitutes the N.E. section of Lake Huron in N. America, and is divided from the lake by Manitoulin Island and the peninsula containing the two counties, Grey and Bruce. The bay is nearly 100 m. long and 50 m. broad. It is fed by many rivers, chief among which are the Rivers French, Maganatavan, and Muskoka. The southern portion of the bay is watered by the R. Nottawasaga.

The Trent Valley Canal connects the bay with the Bay of Quinto and Lake Ontario. There is a scheme in hand to open up communication with Montreal by a similar canal system.

Gephyrea, the name given to a large class of marine worms, which includes the four orders Sipunculoidea, Priapulidea, Echiuroidea, and Epithetosomatoidea. The Sipunculoidea are elongated and vermiform in shape, and live in the ooze and sand at the bottom of the sea; occasionally they bore into coral rock; *Phrynosoma* and *Sipunculus* are the most important genera. The Priapulidea contain the two genera *Priapul* and *Halicryptus*, cylindrical animals with the mouth at one end and the anus at the other. The Echiuroidea are distinguished by the presence of a long contractile dorsal outgrowth, forming the proboscis. The Epithetosomatoidea contain a single family, the Epithetosomatoidea, which are remarkable for their long, tubular proboscis, and for a series of pores which lie on each side of the body.

Geraldton, a tn. 230 m. from Perth in Western Australia, situated on Campion Bay. It is noted as being the port for the Murchison goldfield. It has a good harbour; the chief exports are gold, copper, sandalwood and wool. Pop. 4000.

Gérard, Etienne Maurice, Comte (1773-1852), a celebrated French general and marshal of France under Louis-Philippe. He served as a volunteer under Dumouriez and Jourdan, became captain in 1794, and accompanied Bernadotte to Vienna as aide-de-camp in 1798. He was present at Jena (1806), Erfurt (1806), and commanded the Saxon cavalry at Wagram (1809). G. first won fame by his splendid charge at Austerlitz in 1805. He went to Portugal from 1810-11, and then did great service to France during Napoleon's Russian campaign, helping to save the rear-guard of the Grande Armée during the retreat, 1812. He distinguished himself at Bautzen in 1813, was wounded at Leipzig, but fought at La Rothière and Montereau. Joining Napoleon after his escape from Elba, G. fought at Ligny in 1815 with Grouchy. Louis XVIII. named him Grand Cross of the Légion d'Honneur. G. was a member of the Chamber of Deputies in 1822 and 1827, took part in the revolution of 1830, besieged and took Antwerp, 1832, and succeeded Mortier as Grand Chancellor of the Légion d'Honneur, 1835. Napoleon III. made him senator in 1852. See M. J. Nollet, *Vie*.

Gérard, François Pascal, Baron (1770-1837), a French painter, b. in Rome. He entered the Pension du Roi at Paris at the age of twelve, and from there went to the studios of Pajou, the sculptor, and Brenet, the painter, whom he left shortly to study under David. He competed for the Prix de Rome in 1789, but was unsuccessful. Two years later he again presented himself, but his father's death prevented the completion of his work. He then went to Rome for a year, but returned to Paris in 1791, and obtained employment under his former master, David. In 1796 he painted his famous 'Bélisaire,' and the following year 'Psyché et l'Amour.' From 1808 to 1810 he exhibited quite a number of pictures at the French Salon. He is best remembered by his portraits, notably of Napoleon, Talleyrand, Mme. de Staël, and Mme. Récamier.

Gerard, James Watson, American lawyer and ambassador, b. Aug. 25, 1867, at Geneseo, N.Y.; son and grandson of persons of the same name as himself: the grandfather having been a lawyer and philanthropist, and the father a lawyer and historical writer. G. graduated at Columbia Univ. in 1890, and became LL.B. of New York Law School in 1892. In the latter year he was admitted to the Bar, and began practice in New York City. He was chairman of the Democratic campaign committee of New York county for four years. He was 2nd lieutenant and captain of 12th Infantry, National Guard, New York, and served on the staff of General McCoskry Butt; then major and quartermaster of 1st Brigade of the same body—1900-4. Elected assoc. justice of Supreme Court of New York for term 1908-21, but resigned Sept. 9, 1913, in order to become U.S. Ambassador to Germany. In his first year in Berlin he came to the conclusion that Germany was trying for a *rapprochement* with Great Britain as against the Monroe Doctrine of U.S.A. He formed, and retained, a high opinion of the Crown Prince Friedrich Wilhelm (*q.v.*); but he bears witness to the intolerable arrogance of the Prussian military caste—who, he believed, hurried the preparations for a war because of the beginning of an anti-militarist movement in Germany after the Zabern affair. On the eve of the Great War, he wrote to the British ambassador offering mediation by the U.S.A.; but his letter was never answered. Before the entry of America into the war, G. was most energetic in seeing to the interests of oppressed British prisoners

in Germany. He gives a detailed and most interesting account of his experiences in *My Four Years in Germany* (1917)—written when he had resumed practice in New York. He has also written *Face to Face with Kaiserism* (1918). He holds the British distinction of K.C.M.G.

Gerard, John (1545-1612), an English herbalist and writer on gardening. He lived for some time at Holborn, London, keeping a large physic garden there, and practising as a barber-surgeon. He kept Lord Burghley's gardens for over twenty years. In 1596 G. published his *Catalogus arborum, fructuum ac plantarum . . . in horto Joannis Gerardi*



JOHN GERARD

. . . (1100 varieties). His *Herball, or Generall Historie of Plantes*, 1597, was based on Dodoens' *Stirpium Historie Pemptades*, 1583. An enlarged edition was issued by Th. Johnson in 1633. G. became master of the Company of Barber-Surgeons, 1607. See *Life* in reprint of *Catalogus*, 1876; *Arber's Reprint of Stationers' Registers*, iii. 21; *Dict. of Nat. Biog.*

Gerard of Cremona (1114-87), the mediæval translator of Ptolemy's astronomy. He studied ancient wisdom in the Spanish and Moslem schools of Toledo, and having acquired a knowledge of Arabic, devoted the remainder of his life to the making of Latin translations from its literature. His most celebrated work is the translation of Ptolemy's

Almagest. He is also said to have translated about sixty-six other treatises. He d. at Cremona in Lombardy.

Gérardmer, or **Géromé**, a health-resort and tn. of Vosges dept., 18 m. from Saint-Dié, on G. Lake, near L. Longemer and Retournemer. It was named in honour of Gérard of Alsace, who built a tower by the lake (c. 1070). Noted for its picturesque position, it is a tourist centre. It has manufs. of linen, household utensils, and hemp, and large trade in Géromé cheese. Pop. (com.) about 10,000.

Gerasa (Γέρασα, modern Jerash), an ancient city of the Decapolis, Palestine, 56 m. from Jerusalem. It is among the mountains of Gilead, about 20 m. E. of Jordan. Grove identifies it with Ramoth-gilead. In 83 B.C. it was captured by Alexander Jannæus of the Maccabean line, and rebuilt by the Romans, 65 B.C. G. was very important in the time of the Antonines (A.D. 138-180). It was a bishop's see in early Christian times. It cannot be the 'country of the Gerasenes' (see Wilson, *Recovery of Jerusalem*, p. 369). The ruined forum, colonnaded streets, theatres, and temple probably date from the second and third centuries A.D. (see photographs by Palestine Exploration Fund, 1867). See GADARA.

Gerhardt, Karl Friederich (Charles Frédéric) (1816-56), a famous French chemist, native of Strassburg. He studied under Liebig at Giessen, and with Chevreul, and translated several works of Berzélius and Liebig. He went to Paris, and in collaboration with Laurent and Cahours contributed to the *Annales de chimie et de physique*. With Cahours he wrote a memoir on essential oils, embodying new theories. G. was professor at Montpellier, 1844-48, and then returned to Paris, the greater part of his work being done in that city. In 1855 he became professor of chemistry at Strassburg. His chief works are: *Précis de chimie organique*, 1844-45; *Introduction à l'étude de la chimie par le système unitaire*, 1848; *Précis d'analyse chimique*, 1855; *Traité de chimie organique*, 1853-6. See Cahours *Notice sur Charles Gerhardt*, 1856; Grimaux, *Ch. Gerhardt, sa vie, son œuvre, sa correspondance*, 1900.

Gerhardt, Paulus (Paul) (1607-76), a great German hymn-writer of Saxony, second only to Luther. He studied at Wittenberg, became pastor at Mittenwalde (1651), in Berlin (1657-67). He removed to Lubben, 1669, and was pastor there in the Spree-wald till his death. G. supported the Lutherans in their controversies with the reformed churches. Among his

most celebrated hymns are: 'Nun ruhen alle Wälder,' 'Wach auf mein Herz, und singe,' 1648; 'Warum sollt ich mich denn grämen,' 1653; 'Befehl du deine Wege,' 1656, (Wesley's 'Commit thou all thy ways'); 'O Haupt voll Blut und Wunden' (Alexander's 'O sacred head once wounded'). His *Collected Hymns* first appeared 1667. A good edition is that of Gerok, 1890 (4th ed.). See Roth, *P. Gerhardt*, 1832 (new ed. by Lommatsch, 1893); Langbecker, *P. Gerhardt's Leben und Lieder*, 1841; Bachmann and Richter, *Kleinere Schriften*, 1876; Kelly, *Gerhardt's Spiritual Songs*, 1867; *Life* by Stein, 1897.

Géricault, Jean Louis André Théodore (1791-1824), a French painter, leader of the Romantic as opposed to the Classical school. He was pupil of Vernet (1808) and Guérin (1810). G. spent much time in Versailles, and entered the army for a time (c. 1814). He soon returned to his art, visiting Italy (1816-8), and England in 1819. 'Le Radeau de la Méduse,' 1819, his most famous work, is now in the Louvre. The Wallace Collection, London, has his 'Equestrian portrait of the Prince Regent.' His horses are especially fine. Other pictures are: 'A Cavalry Officer on Horseback,' 1812; 'Wounded Cuirassier,' 1814; and studies for a picture of a horse-race in the Corso during Carnival. G. also produced a few bronzes and wax-sketches. See Clément, *Géricault* . . . 1868; Coquatrix, *Géricault, Prose et Vers*, 1846; Blanc, *Géricault*; Brownell, *French Art, Classic and Contemporary*, 1901.

Gerizim and Ebal, in scriptural geography, two hills of Samaria, Palestine. The former (c. 2850 ft. high) stands opposite the latter (c. 3000 ft. high), which is on the N. side of the fertile valley in which lies Nablûs (ancient Shechem). The curse for disobedience to the law was pronounced from Mt. Ebal, the blessing for obedience from Mt. Gerizim (Joshua viii. 33). After the conquest of Canaan, Joshua erected an altar to Jehovah on Ebal (modern Arabic name *Jebel Eslamiyah*). The Samaritans built their temple on G.

German, see BACTERIA and BIOLOGY.

German, Sir J. Edward (b. 1862), distinguished English musical composer, b. in Shropshire, educated at Bridge House School, Chester. He entered the Royal Academy of Music, 1880, leaving it as associate, 1887. He was made a fellow, 1895. His operetta, *The Rival Poets*, was first produced at St. George's Hall, 1886, and revived by the pupils of the Academy, 1901. In 1889 G. became director of music at the Globe Theatre, London, under

Mansfield's management. His incidental music to *Richard III.* (1889) was the first of a series of similar compositions for Shakespearian and other plays. *Henry VIII.* appeared at the Lyceum, 1892—the 3 dances performed during Wolsey's reception at York Place (Act 1) becoming immensely popular; *Romeo and Juliet*, 1895; *As You Like It* (St. James' Theatre), 1896; *Symphonic Poem, Hamlet*, 1897; *Much Ado about Nothing*, 1898. G. also wrote two symphonies, in E minor (Crystal Palace), 1890, and A minor, 1893. He has conducted at many great Musical Festivals. Other works are: *The Emerald Isle* (finished for Sullivan), 1901; *Merrie England*, 1902; *The Princess of Kensington*, 1903; *Nell Gwynn*, 1900; *Tom Jones*, 1907; *Just So Song Book* (with Kipling), 1904; *Fallen Fairies* (with Gilbert), 1909. His coronation march and hymn were performed at Westminster at the coronation of George V., 1911. *The Willow Song* was performed at the R.A.M. Centenary in London in 1922. He has written numerous songs, part-songs, and duets. The melodist and the scholar are happily combined in G. His music is of the school of Sullivan, but has a character of its own, and, apart from his symphonic works, has a strong old-English flavour and a spring-time rhythm. (*A Dict. of Modern Music and Musicians* (DENT), 1924.)

German Baptist Brethren. A religious body founded in Germany during the seventeenth century by Andrew Mack of Schwartz, whose doctrine and discipline were based upon literal interpretation of the Old and New Testaments. Owing, apparently, to the unpopularity of some of their opinions they experienced many difficulties and hardships in Europe, but their emigrant members were able to obtain greater freedom and security in America, where many of them settled during the early part of the eighteenth century. Here they became known as the Dunkers, or Tunkers (from Tunken 'To dip'), adult baptism being one of their important rites. They have always been careful to observe certain of the New Testament customs, which other Christian churches regard as unimportant or as being local customs of Palestine. These include the 'washing of feet' and the 'salutation with a holy kiss.' They have taken a quiet but useful place in works of reform, and were among the first in America to protest against slavery: in 1782 they forbade their own members to possess slaves. During the last

century they have suffered somewhat seriously from the divisions that easily arise from attempts at literal interpretations of the Scriptures. More particularly has this difficulty arisen in regard to the question of the Sabbath, as many of them, believing that there was no warrant for changing the day of rest from the Seventh day of the week to the First, and that the Mosaic Law still held good in this respect, broke away and formed a new body now known as the Seventh-Day Baptists. There have also been other divisions, but the main body has now a membership of about 120,000, while the next most important group has a membership of about 30,000. The G. B. B. came into some prominence during the Great War owing to their belief in the doctrine of non-resistance. Faith-healing is also a prominent teaching in their church, but they are not as well known for this tenet as American bodies of more recent origin.

German Catholics, the name given to a religious sect in Germany who broke away from the Roman Catholic Church in 1844, under the leadership of Ronge, an ex-priest of Silesia, and Czerski, a priest of Schneidemühl, who seceded from the Church of Rome and formed a congregation of 'Christian Apostolic Catholics.' Their first general council was held at Leipzig in 1845. The essentials of belief were restricted to a few doctrines, and the Scripture was laid down to be the sole rule of faith, no external authority being allowed to interfere with its free interpretation. By the end of the year 1845, the G. C. had some 300 congregations. Internal dissension, however, soon set in, and strong measures were taken against the G. C. They were expelled from Austria and their clergy were not recognised in Prussia. Many of the congregations either dissolved or returned to Rome, and in 1859 the majority joined the freethinking association known as the 'Free Congregations.' Six years later this council refused to commit itself to the belief in a personal God. The G. C. movement may be said to have been superseded by the Old Catholics.

German Colonies. Under the Treaty of Versailles (*q.v.*), 1919, Germany surrendered all her overseas colonies and protectorates. German East Africa was ceded to Britain, being re-named Tanganyika Territory, German South-West Africa went to the Union of South Africa; Cameroon and Togoland were jointly partitioned between France and Britain (*see* AFRICA; CAMEROONS; TOGOLAND). The German lease of

Kiao-Chao and other interests in Shantung, together with the German Pacific islands north of the equator, were ceded to Japan; the German portion of Samoa to N. Zealand, and German New Guinea and the remainder of the possessions in the Pacific to Australia. In addition, Germany renounced all her special rights and privileges in China, Siam, Morocco, Liberia and Egypt. Conformably with the development of a sense of common responsibility for the welfare of mankind, these colonies were received by the victorious Allies not as absolute sovereign possessions, but as mandated territory. In this way the administration of German colonies in S. Africa was entrusted to Britain, France and S. Africa; the Pacific Islands to Australia, N. Zealand and Japan. (*See also* under the various countries named.)

Germander, the name given to the British species of *Teucrium*, a genus of labiate plants. The wood *G.* is *T. scorodonia*; the wild *G.*, *T. Chamædrys*.

German East Africa. Formerly a German colony in Equatorial East Africa, and Germany's largest dependency, this area, which is bounded by Uganda, Victoria Nyanza and Kenya Colony on the N., the Indian Ocean on the E., Portuguese E. Africa and Lake Nyassa on the S., and Northern Rhodesia, Lake Tanganyika and Belgian Congo on the W., was conquered by the Allies during the Great War. It then became known as Tanganyika Territory and, with the exception of the districts of Ruanda and Urundi, which were joined to the Belgian Congo, and a small district in the S., which was added to Portuguese E. Africa, passed into the possession of Great Britain, under the mandate of the League of Nations. Its total area is 374,000 sq. miles; and its population is: native, 4,742,000; European, 5,808; and Asiatic, about 15,000. Dar-es-Salaam is the capital. *See* under Tanganyika Territory, and for the Campaign, *see* AFRICA, GERMAN EAST, CAMPAIGN (GREAT WAR).

Germanicus, Cæsar (Tiberius Drusus Nero) (c. 15 B.C.-A.D. 19), a famous Rom. general, son of Nero Claudius Drusus and Antonia (Mark Antony's daughter). He fought against the Dalmatians and Pannonians (A.D. 7-10), early holding consular rank. G. was a favourite with Augustus, who gave him command of eight legions on the Rhine (A.D. 14), and gained his adoption by his uncle, Tiberius. On the death of Augustus, the legions tried to make G. emperor, but he was loyal to Tiberius, and with difficulty checked their ardour.

Undertaking dangerous campaigns in Germany, he defeated Arminius, and recaptured the eagles taken from Varus (A.D. 9). Tiberius, jealous of his success, recalled him (A.D. 17) to Rome, where he enjoyed a triumph. He was then sent out to the East, where his moderate measures won him gratitude from all. He died at Antioch, probably poisoned by C. Piso, a favourite of Tiberius. Caligula and the younger Agrippina were his children. See Tacitus, *Annals*, vol. ii.; Lagerloef, *Vita C. Germanici*, 1698; de Beaufort, *Histoire de C. Germanicus*, 1741; Hillebrand, *Germanicus*, 1817.

Germanic Laws, The, is the designation of the systems of law evolved and codified by the principal Teutonic tribes on the establishment of native kingdoms on the retirement of the Romans from Germania. The codes date back to the fifth and sixth centuries, and show in general a blend of native tribal law and of Roman law. The following tribes possessed coded laws: Alemans, Bavarians, Burgundians, Frisians, Saxons, Thuringians and Visigoths. The codes were framed in the Latin language with scraps of barbaric legal terminology. The need for codification seems to have arisen from the difficulties experienced by the Romans in endeavouring to administer their system of law with various tribes, each possessing a system of its own.

Germanium, a chemical element discovered in 1886 by Winkler in argyrodite ($\text{GeS}_2 \cdot 4\text{Ag}_2\text{S}$), a mineral found at Freiberg. It also occurs to a minute extent in the mineral euxenite. In almost all its compounds it is quadrivalent, and it has marked affinities with silicon and other elements of that group. In properties it agrees very closely with Mendeléef's hypothetical eka-silicon. Atomic weight 72.5; melting point 900°C .

German Ocean, see NORTH SEA.

German Silver, or **Nickel Silver**, an alloy consisting approximately of six parts copper, three parts zinc, and one part nickel, with sometimes a trace of iron. It forms a white, tough metal, taking a good polish, and is largely used for the manufacture of spoons, forks, and other similar articles, but, as it soon tarnishes, it is usually electro-plated. G. S. has a high electrical resistance, and is largely used for making resistance coils.

German South-West Africa, see AFRICA, SOUTH-WEST.

Germantown, a former suburb now a ward in the N. of Philadelphia, Pennsylvania, U.S.A. It contains

many historic houses, for instance, the Chew House, built by Benjamin Chew, who was imprisoned as a Loyalist in 1777, and the Morris House, the headquarters of General Howe, and the residence of President Washington when Philadelphia was the capital of the U.S.A. In this vicinity, too, the first paper mill in America was erected in 1690, and the first Bible printed in America was published here in 1743. G. was founded in 1683 by thirteen families from Germany, incorporated in 1689 and annexed to Philadelphia in 1854. A famous battle in the War of Independence took place here Oct. 4, 1777. The principal manufactures are knitted goods, yarns and textiles.

Germanus, Saint (c. 650-740), a Patriarch of Constantinople, being transferred from Cyzicus to this see in 715. He defended the practice of the Church against the Emperor Leo, who espoused the cause of the Iconoclasts, and received a letter of encouragement from Pope Gregory II. In 730 he was ejected from his office. His principal works are: *A Defence of The Orthodoxy of the Writings of St. Gregory of Nyassa*; *A Treatise on the First Six Ecumenical Councils*; *A Collection of Sermons and Hymns*.

German Volga Republic. One of the eleven autonomous republics included in the Russian Socialist Federal Soviet Republics. Except for a short distance in the S.E., where it adjoins Kazak in Asiatic Russia, it is enclosed by the Lower Volga Area. Pokrovsk (pop. 34,352), on the Volga opposite Saratov, is the capital; Urbakh is the junction for railways running from Moscow to Astrakhan and Uralsk. The republic is governed by a Central Executive Committee and a Council of People's Commissaries.

Germany (Deutschland), a republic of Central Europe, which has a total land area of 180,976 sq. m. (excluding the Saar, 738 sq. m.). Of its 4569 m. of frontier, 1220 m. only are bounded by the sea. The northern boundaries are the Ger. Ocean, the Danish peninsula, and the Baltic; the eastern, Russia; the southern, Austria and Switzerland; and the western, France, Belgium and the Netherlands. The States of the Republic are seventeen in number; the Free State of Prussia (including Waldeck), 113,033 sq. m.; Bavaria (Free State), 29,334 sq. m.; also the Free States of Saxony, 5,789 sq. m.; Mecklenburg-Schwerin, 5,096; Oldenburg, 2,480; Brunswick, 1,418; Anhalt, 888; Lippe, 469; Mecklenburg-Strelitz, 1,131; Schaumburg-Lippe, 131; also the Hanse States of Hamburg, 160 sq. m.; Bremen, 99; and Lübeck,

115; the People's States of Württemberg, 7,532 sq. m., and of Hesse, 2,970; the Federated State of Thuringia, 4,527 sq. m.; and the Republic of Baden, 5,819 sq. m. Many other names are still in common use, referring to distinctive tribal settlements or distinctive parts of the old Holy Rom. empire, but now they have only an historic significance, as the barriers of the divisions they describe have long since been swept away or altered. Thus the plain stretching from the North Sea to the N. and W. of the Harz Mts. was once known as Westphalia; Rhenish Bavaria and the N. of Baden were once the Palatinate; Thuringia was formerly the four Saxon duchies and the region S. of the Harz; whilst Franconia included the Main districts of Bamberg, Schweinfurt, and Würzburg. Other names which in earlier times had a very real territorial significance were Swabia, E. Friesland, Lusatia, and Voigtland.

Physical characteristics.—The coast line is interrupted only by the small isthmus of Schleswig, yet it contains hardly any good harbours. The reasons for this are: (1) That on the Baltic shallow lagoons, or land-locked bays called Haffs, prevent good anchorage; (2) that the shore waters are not deep enough for vessels of any size; and (3) that, owing to the lack of protection N. and E., the Baltic ports are constantly choked with ice. Along the North Sea shores are numerous dykes which serve, as in Holland, to keep out the sea, where the sand-dunes are not strong enough. The surface of Germany falls naturally into three divisions: the lowlands in the N., the tabieland of the S., and the basin of the middle Rhine. The lowlands are part of the Great European plain, and are largely occupied with sandy tracts, with here and there peaty deposits. They are well watered, and in certain districts fertile, whilst the monotony of their level is broken by two lines of hills whose heights vary from 500 to 800 ft., and which may be said to extend roughly from the Mecklenberg to the Vistula, and from the moors of Luneburg in Hanover to Silesia. In the southern plateau of Bavaria, the Fichtelgebirge is clearly the pivot round which the other mountain systems revolve. Thus, to its N.W. there rise the Thuringian Forest and the Harz Mts., and to the N.E. the Erzgebirge, the Riesengebirge, and the Sudetic Mts. S.W. radiate the Franconian and Swabian Juras and the Schwarzwald or Black Forest heights. Westward stretch the Taunus Mts., whilst beyond these,

and divided only by the Rhine, are the ridges of the Vosges. In the extreme S.E. of Bavaria the Tyroloese or Noric Alps follow the northern bank of the Inn, and from this range rises the Zugspitze (9700 ft.), which is the highest summit in the whole empire. Between Basle and Mannheim the Middle Rhine is splendidly sheltered by the Vosges and the Black Forest, which guard its course to left and right. This part of the river is completely Ger., although of course the upper Rhine comes from Switzerland and the lower reaches run through Holland to the Ger. Ocean. Within Ger. territory the chief tributaries on the right are the Neckar, Main, Lahn, Sieg, Ruhr and Lippe, and on the left the Moselle. Fortunately the watersheds are both far from the sea (which accounts for the considerable length of many of the rivers) and also comparatively low, so that there are no great falls in the main streams. They are, therefore, navigable for the greater part of their course. Steamers can reach Ratisbon on the Danube, Prague on the Elbe, Schaffhausen on the Rhine, Ratibor on the Oder, beyond Warsaw on the Vistula, and Cassel on the Elbe. The Vistula and the Oder are Baltic waterways, but more important from a commercial point of view are the Elbe, with its chief affluents the Mulde, Havel, and the Saale, and the great Rhine, which both empty into the North Sea along the smaller Ems and the Weser, which is the only purely Ger. stream. This latter fact is worth noticing, as the sources of the Oder, Elbe, and Vistula must be traced in Austria, and sections only of the Rhine and Danube traverse Germany.

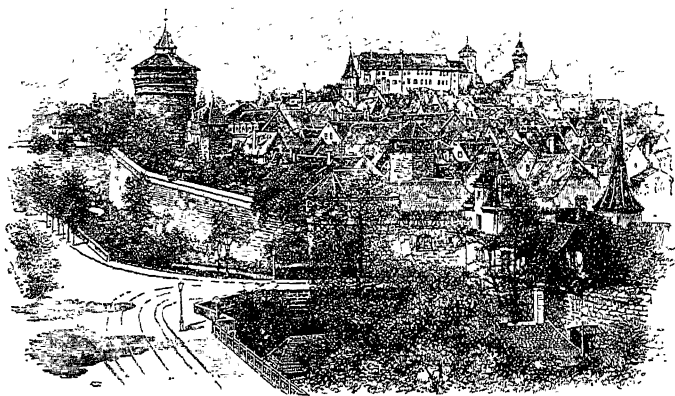
Climate.—A sketch of the physical characteristics leads naturally to a consideration of the climatic conditions. Broadly speaking, the general contours are not favourable to climate; for the level exposed flats, N. and E., offer no resistance to the passage in winter of the dry, piercing winds from Siberia and the Arctic, whilst to the S. and W. the mountainous tracts form effectual barriers against the moist Anti-trades. As regards temperature, the extremes increase eastward in proportion to the distance from the Atlantic. In the warmer latitudes of the S., the elevation of the plateaus counteracts the natural tendency to grow hotter, so that Ratisbon lies on the same isotherm as Hamburg. In the Upper Harz the rainfall reaches 66 in., as the Harz Mts., are far enough N. to catch the rains borne by the winds sweeping across Holland, but the mean annual precipitation is only

about 20 in. On the whole the climate may briefly be described as continental. It should be noted that the general slope of the country is from the S.E. to N.W., that is, away from the sun, and also that the Rhine valley is so delightfully sheltered that it reaps the full benefit of its warm latitude, and thus enjoys excellent weather conditions.

Forests.—As would be expected the boisterous winds from the sea dwarf the scanty trees in the N.W., the land being covered for the most part with moors and heaths. Trees are still plentiful in the Bohemian, Black and Thuringian Forests, and large masses of timber are floated

would be expected from the union, which occurs here, of the Alpine and Baltic elements. As regards the fauna, there are hardly any species found only in G. The elk still exists in the forests of E. Prussia, and the wild boar, stag, and roe continue to occupy the remoter and more hilly districts. All larger game have been extinguished. The rivers and seas teem with fish, the former abounding in members of the carp and salmon tribes.

Agriculture.—The agricultural returns (1928) show arable land, 51,556,972 ac.; grass and pasture, 20,165,876 ac.; vineyards, 204,575 ac. Wheat and barley average at



NUREMBURG

The Castle from the Hallerthorbrücke

down the Neckar and Vistula. Chief among the deciduous trees are the beech and oak, but these do not cover more than a third of the forest lands; the Scots pine (*Kiefer*), however, is ubiquitous and, together with the white birch, makes up nearly a half. Statistics show better than anything else the extent of the forest area. It is estimated at about 34,500 acres, the output in timber each year being reckoned at over 26,000,000 cubic yards.

Flora and fauna.—The flora and fauna are fairly extensive, including over 2000 varieties of vascular plants and as many as 16,000 species of insects. All plants peculiar to the temperate zone are cultivated with success, and in general the flora may be said to be largely such as

about 4,000,000 metric tons per year, and rye at nearly 12,000,000. Rye and oats (8,000,000 metric tons) are grown in the N. despite the drawbacks of poor climate and soil. Almost as much land is devoted to potatoes as to rye, for the sandy plains of W. Prussia and Pomerania seem to suit this crop equally well. Flax, hemp, and the beet—the last for the sugar industry—are grown in Saxony and in the Baltic provinces, especially in Hanover. The vine covers the dry, sunny slopes of the Vosges, and is also grown along the Rhine. The rich alluvial soils of the sheltered valleys in the S.W. are also favourable to the production of tobacco and hops, which are accordingly cultivated with success in Baden, Hesse, and Bavaria. The co-operative system is a marked

feature of Ger. agriculture, and the societies number some 37,000 with a membership of over four million. Over thirteen million are employed in agriculture in G.

Fisheries.—Owing to the exertions of gov., and especially of the Ger. fishing league, the yield of both the Baltic and N. Sea (G.) fisheries have greatly increased, although all kinds of fish have still to be imported to keep up with the home consumption. Haddock, herring, and cod are the chief catch.

Minerals.—G. is rich in minerals, especially in coal and iron. The great industrial activity of the country very largely depends on the fact that these two minerals are found together, and moreover in proximity to navigable water-courses. In the Rhine basin the coal beds follow the courses of the Ruhr, Saar, and Ill, and excellent iron ore is found in both the Ruhr and Saar coalfields. Coal is also found in Silesia, whilst the Saxon mines in the Elbe basin yield chiefly the lignite variety. Almost one-half of the zinc produced in the world is mined in G., the chief centres being at Aachen (Aix-la-Chapelle), in Rhenish Prussia, and Königshütte, on the Oder coalfields, whilst nearly half the silver of Europe is raised from the silver, lead, and copper ores found in the Harz Mts., Silesia, and the mines of Freiberg (Saxony). Most of the Ger. copper comes from the Harz and Erzgebirge Mts., whilst large quantities of rock and potassium salts are produced in Hanover, Saxony, Thuringia, and Anhalt. The mineral springs of Baden-Baden, Wiesbaden, Ems, etc., are world-famous.

Internal communications.—In 1924 the Ger. railways which since 1920 had been operated through the Central Gov., were put under the management of a private company—the Ger. Railways Company—but they remain state property. The total length of line is over 36,000 m. Berlin is splendidly provided with communications by rail, and it may with truth be said that it is within twenty-four hours' reach of almost any point in the country. Further, the trunk systems have many of them an international importance; for the great Oriental express from Paris to Constantinople traverses the line from Strassburg to Vienna through Munich, whilst Paris is linked with the remote Siberia by means of the lines from Cologne to Berlin and from Berlin to Warsaw. Berlin is also directly connected with Breslau, Hamburg, Danzig, and Königsberg (365 m.). From Frankfort-on-Main, which is the trading centre between N. and S. G., lines radiate to Cologne,

Ostend, Antwerp, Flushing, Rotterdam, and Berlin northward, and in a southerly direction to Strassburg, Basle, Munich and Vienna, whilst E. and W. it is joined up with Dresden, Breslau, and Metz.

Domestic commerce has been further facilitated by an elaborate network of canals. By far the most important of these is the Kaiser-Wilhelm Canal (61 m. long), which unites the N. Sea and the Baltic. The Dortmund-Ems (150 m. long) and the Elbe-Trave (43 m.) have only recently been completed, whilst there are extensive schemes on foot for still further artificial water-communication. Since the building of the Rhine and Rhone canal through Mulhausen, it has been possible for a barge to pass from Rotterdam to Marseilles without unloading. The union of the Danube and Rhine is effected by the Ludwigs canal, and that of the Seine and Rhine by the Rhine and Marne Canal. A number of canals, including the Teltow (opened in 1906), serve to connect the Spree, and therefore Berlin, with the Oder and the Elbe, the Oder and Vistula being joined by what is known as the Bromberger Canal. In 1874 the postal and telegraphic departments were amalgamated and since that date have made remarkable strides forward. They are now controlled by the Central Gov. The total number of post offices is about 49,000, employing some 367,000 people.

Manufactures.—The industrial development of the empire proceeded at an almost unprecedented rate throughout the last century. The following catalogue will give some idea of the local distribution of the various industries. Iron goods and machinery are manufactured in Prussia, Saxony, and Bavaria; steel goods in Rhenish Prussia. Woollens and worsteds are produced in Saxony and the Rhine province; cotton goods in Prussia, Saxony, Baden, and Bavaria; silk at Elberfeld (Rhenish Prussia) and in Baden; and linen goods in Westphalia, Silesia, and Saxony. The Rhine and Moselle districts are important centres for light wines; Bavaria is famous for its toys, like Nuremberg for its watches and pencils, and Meissen, Dresden, and Berlin, etc., for their porcelain. Finally there are manufactories up and down the country of chemicals, beer, sugar, tobacco, leather (in Hesse-Darmstadt), and paper.

Chief towns.—In 1925 there were forty-six towns with a pop. of over 100,000. The following are the main cities of G.: Berlin (see *infra*) in Prussia, the capital of the republic, and a great political and industrial

centre; Hamburg in Hamburg, the fifth of the world's great ports (after London, New York, Liverpool, and Marseilles), and doing more tradethan all the other Ger. ports together: Munich, the capital of Bavaria; Dresden, the capital of Saxony; Leipzig in Saxony, a university and also a centre of the leather and fur trades; and Cologne, and Breslau in Prussia, both of which have the advantages of rich coal and iron fields and navigable rivs. Frankfurt (Prussia) has over 400,000 inhabitants, and Düsseldorf and Hanover in Prussia, and Nürnberg in Bavaria, over 300,000. Essen is the Birmingham of Prussia, and Chemnitz of Saxony. Chemnitz is also the Manchester of Saxony, as Elberfeld is of Prussia. Solingen may justly be called the Sheffield of Prussia. Wülst Krefeld is the Lyons; Magdeburg in Prussia is busily engaged in the iron and woollen industries. After Hamburg, the other notable harbours are Bremen on the Weser, which has a large emigration traffic and is also the headquarters of the North German Lloyd steamers; Stettin, the nearest port for Berlin; Danzig, Königsberg, which is engaged in the flax and hemp trade; Kiel and Lübeck, once the capital of the Hanseatic League. The pop. of the largest towns are: Berlin 4,013,588; Hamburg, 1,079,092; Cologne, 698,064; Munich, 680,704; Leipzig, 679,159; Dresden, 619,157; Breslau, 554,801; Essen, 468,696; Frankfurt, 461,849; Düsseldorf, 431,096; Hanover, 422,435.

Commerce.—The growth in the commercial prosperity of the empire during the nineteenth century was extraordinarily rapid, but the advent of the Great War, with the subsequent treaty of Versailles, did much to check this expansion. This abnormal development was, in great measure, due to the fostering cares of the 'Zollverein,' or Ger. Customs Union, which since 1879 has definitely incorporated G. among protectionist countries. In 1928 imports were valued at 14,045,000,000 gold marks and exports at 12,053,000,000. Grain and flour, textile goods, raw minerals, chemicals, hides and leather comprise the chief goods imported, whilst sugar, all forms of textile manufactured articles, leather goods, iron and iron wares, including machinery, coal, paper and glass, are the staple exports. In either of the above lists the various groups of merchandise are tabulated, broadly speaking, in order of value. A large proportion of Ger. merchandise passes out through Rotterdam and Antwerp, the overland commerce being at least as extensive as its maritime. Trade with

Great Britain (1929) was valued at £68,789,611 (imports) and £37,120,076 (exports), while trade with the U.S.A. (1928) was \$467,205,408 (imports) and \$221,978,785 (exports).

Shipping.—The Ger. mercantile navy now stands fourth, after the United Kingdom, the U.S.A., and Norway, in point of number of ships, but as regards tonnage it is superior to Norway, and therefore comes third. In 1929 the total number of steamers was 1,704 and of motor ships 401 and of sailing vessels 22. The aggregate tonnage is 4,092,552. The foreign ships with cargo which entered and cleared Ger. ports in 1929 numbered 16,803 and 14,391 respectively, with tonnage of 19,260,203 and 13,315,755, while the lighter Ger. ships numbered 52,426 with 19,837,758 tonnage entering and 55,081 with 17,862,922 tonnage clearing.

Colonies.—G. pursued a vigorous colonial policy from the time of Bismarck, but by the Treaty of Versailles (1919) the Ger. colonial empire was entirely destroyed. During war time, subsequent to 1915, all Ger. colonies had fallen into the hands of Eng., France, and Japan, while secret treaties existed to perpetrate the occupation in the event of an Allied victory. By the Treaty of Versailles the former Ger. colonies were partitioned as follows:—The *Kamerun* was divided into the New Cameroons (107,000 sq. m.; native pop., 2,800,000), which was incorporated into French Equatorial Africa, and the Old Cameroons, which were placed, in part, under a French Mandate (166,489 sq. m.; pop. 3,000,000) and in part, under a British mandate (31,000 sq. m.; pop. 555,000). As 'B' mandates of a similar class, 22,000 sq. m. of Togoland (pop. 747,000) went to France and the remaining 12,600 sq. m. (pop. 185,000) to Great Britain. Former Ger. E. Africa was renamed Tanganyika Territory and became a British possession. Ger. S.W. Africa was awarded to the British Union of S. Africa; New Guinea (Ger. Kaiser Wilhelm Land, Bismarck Archipelago, and Ger. Solomon Islands) to Australia; Ger. Samoa to New Zealand; Nauru Islands to Great Britain; and the Caroline, Marshall, Marianne, and Pelew Islands to Japan, which country received also Kiaochow.

Population.—The pop. of the Ger. Republic (1925) is 62,348,782, but this excludes the Saar, of which the estimated pop. is 770,000. The pop. of the various states are as follows: Prussia, 38,109,922; Bavaria, 7,379,594; Saxony, 4,996,138; Württemberg, 2,579,453; Baden, 2,312,462; Thuringia,

gia, 1,609,300; Hesse, 1,317,295; Hamburg, 1,152,489; Mecklenburg-Schwerin, 674,411; Oldenburg, 543,749; Brunswick, 501,675; Anhalt, 351,435; Bremen, 338,846; Lippe, 163,577; Lübeck, 127,971; Mecklenburg-Strelitz, 110,371; Schaumburg-Lippe, 48,044. The surplus of births over deaths is some 400,000, and this is making up for the gap in the pop. caused by the Ger. casualties in the Great War. These numbered 2,050,466 dead and 4,202,028 wounded. The average annual number of emigrants is

Reichsrat, which is equally federal, each state being represented by members of its own gov. A state has at least one representative, while the larger states send one delegate for every 700,000 inhabs. The Reichsrat is not superior to the Reichstag or National Assembly to the same degree as was the old Bundesrat. Election to the Reichstag is by universal suffrage and proportional representation. The Reichsrat is a consultative rather than a legislative chamber. The gov. must ask its consent before intro-



[D. McLeish

IN THE MEDIAEVAL TOWN OF ROTHENBURG, PRACTICALLY UNTOUCHED BY THE BUILDER SINCE THE SIXTEENTH CENTURY

60,000, of which nearly 70 per cent. go to America.

Constitution and government.—After the Ger. Revolution and the abdication of the Emperor Wilhelm II. in 1918, the empire came to an end and was replaced by a republic. The Constituent Assembly met in Weimar to consider the provisional constitution drawn up by Hugo Preuss, a former official of the Prussian Ministry of the Interior. Preuss advocated a strongly centralised authority, but the Constitution as finally adopted revealed G. as once again a federation of individualist states. The Bundesrat or Federal Council was replaced by the

Reichsrat, which is equally federal, each state being represented by members of its own gov. A state has at least one representative, while the larger states send one delegate for every 700,000 inhabs. The Reichsrat is not superior to the Reichstag or National Assembly to the same degree as was the old Bundesrat. Election to the Reichstag is by universal suffrage and proportional representation. The Reichsrat is a consultative rather than a legislative chamber. The gov. must ask its consent before intro-

ducing a Bill, and if this is refused the gov. must explain to the Reichstag the difference of opinion. If the two Chambers cannot agree, the President may call a referendum. The President of the Reich is elected by an absolute majority in the National Assembly for a period of seven years and may be re-elected. He has command of the army, but his powers are limited in the same way as those of the Fr. President in that all orders require the counter-signature of the Federal Chancellor. The President may summon anyone he likes to form a ministry, but the Chancellor depends on the support of the Reichstag.

After the Revolution, some of the old political parties changed their names. The Conservatives (Junker Party) became the National People's Party (Nationalists), and their policy was to extend the powers of the President and to limit those of the Reichstag. The National Liberals became the People's Party, representing industry and commerce, and their policy was one of capitalistic enterprise. The Centre Party retained its position, relying on the support of the Catholics. The individualist Radicals reorganised themselves as the Democratic Party and are bourgeois and republican in sympathy. The remaining parties are the Majority Socialists and the Independent Socialists. In the first parliament under the new Constitution the parties were represented thus: Nationalists, 42 seats; People's Party, 21 seats; Centre, 88 seats; Democrats, 75 seats; Majority Socialists, 163 seats; and Independent Socialists, 22 seats. The new National Socialist (*Nazi*) party rose to sudden prominence in 1930-1.

Law and Justice.—Ger. civil law, which is a model of codification, was first drawn up in 1887, and after revision became law in 1896. At the time an entire transformation of the Commercial Code and the Code of Civil Procedure was effected to bring it into harmony with the Civil Code, and these Codes came into force in 1900. A further revision of the Code of Civil Procedure took place in 1924. The Code of Criminal Law, which still prevails, was revised in 1876. The arrangement of the Civil Code is based on Rom. law, which in a modernised form was the 'common law' of G. before the introduction of the Civil Code. The Code is divided into five books: the first is general; the second, third, fourth, and fifth books treat of the 'law of obligations,' the 'law of things,' 'family law,' and the 'law of inheritance.' The Commercial Code contains three divisions; the first deals with mercantile trade generally, the second with mercantile partnerships, and the third with mercantile transactions. There is no actual guide to the interpretation of Ger. law, but precedent, although theoretically not binding, carries great authority in practice.

There are four kinds of courts: the ordinary, the special, the administrative, and the Staatsgerichtshof, which last is a court for settling constitutional questions. With the exception of this state court and the supreme court (Reichsgericht), the establishment of courts is the business of the individual states, and the New Constitution of 1918 has not interfered with this. The *Reichsgericht*, situated

at Leipzig, is composed of a President and a sufficient number of senators and councillors appointed by the National President upon the recommendation of the Reichsrat. Directly under this supreme court ('Reichsgericht') are twenty-nine courts, which have original jurisdiction in serious offences, and which are presided over by seven judges. These are the 'Oberlandesgerichte,' which are the first courts of the second instance. Below them are 173 'Landgerichte,' which have a fairly extensive jurisdiction in civil and criminal cases and in divorce proceedings. There are five judges in the criminal chamber of a 'Landgericht' four votes being required to make a conviction valid. Three judges from such a court preside at intervals over jury courts ('Schwurgerichte'), and juries do not, therefore, form a permanent part of the system. Not the least important work of the 'Landgerichte' is to revise the decisions of the 'Amtsgerichte,' which are the lowest courts of the first instance, being controlled by single judges, who are competent to hear only petty civil and criminal cases. Among the special courts are the Courts of Arbitration and Labour Courts. These latter, instituted in 1927, have a specified jurisdiction, especially over cases between employers and employees. The Administrative Courts as laid down by the constitution are 'for the protection of individuals against orders of the administrative authorities' (Art. 107). Ger. law provides adequate legal remedies against decisions in civil and criminal affairs. One feature which requires special note is that a trial may be preceded by a judicial investigation, conducted in a scientific manner by an investigating judge, especially trained and with wide powers. The practice of Ger. law is a successful compromise between a national and a federal law. National administration limits the sovereignty of the states, but control of the courts is largely left to the individual states.

Army and Navy.—By the law of Dec. 30, 1920, the Ger. army was constituted at the strength allowed by the terms of the Treaty of Versailles, the limit being 100,000 men, of which no more than 4000 were to be officers, the men serving for twelve and the officers for twenty-five years. Only a certain number of discharges were allowed each year to avoid the formation of a reserve force of men who had undergone military training. Discipline and efficiency in the Ger. army have been rigidly exacted. The former Ger. General Staff was proscribed, but in spite of this General von Seeckt was

given the rank of Commander-in-Chief of the Reichswehr. The Federal armies have been abolished, but a decentralised body of police (Schützpolizei) exists, trained on military lines. By the Boulogne Note of June 22, 1920, the number of police permitted to G. was fixed at 150,000, of which 85,000 were allotted to Prussia. By the same terms the police were allowed one rifle to every three men, a machine pistol to every twenty men, and one armoured car to every thousand men. In addition to the police, there was an armed citizen guard, called the *Eimwohnerwehr*. This force was disbanded owing to Allied pressure after the Kapp Putsch in Aug. 1920, but the Bavarian *Eimwohnerwehr* remains. Conscription for the Ger. army has been abolished.

By the terms of the Armistice the Ger. navy was surrendered, and by the Treaty of Versailles it is now constituted at six battleships, six cruisers, twelve destroyers, and twelve torpedo boats, while submarines have been prohibited. G. has remained within these limits, only replacing old ships by new ones without increasing the number in active commission.

The air force as a military weapon has been disbanded, but commercial aviation is believed to be more advanced in G. than in any other country in Europe.

Finance.—The greatest factors in Ger. public finance have been the enlarged scope of governmental activities since the Revolution and the operations of the terms of the Treaty of Versailles. Under the new Constitution the tax system and administrative charges have become centralised. The right of direct taxation belongs now to the federal gov., and as compensation the various states receive a share in the revenues amounting to about 3500 Reichsmarks out of a total receipt of 11,039,000,000 (figures for 1920–30). This sum comprises in millions of marks taxes (8121), customs (1204), revenues (754), railway bonds under the Dawes scheme (660), industrial debentures (300). The following figures for 1929–30 will show the distribution of the revenue in millions of Reichsmarks: payments to states, 3467; administrative charges, 2480; unemployment, 154; pensions, 1719; expenses arising out of the war, 252; service of debt, 466; Dawes scheme, 2501. The payments to the states represent a proportion of the federal taxes, especially the income and turnover taxes. The minimum figure is 2600 millions. The largest expenditure of the local govts. is for social and relief work, represent-

ing about a third of the state revenue, which is made up of state tax revenues, administrative revenues, and transfers from the federal gov. in roughly equal proportions. The total cost of government in G., both local and federal, amounts to some 18,000,000,000 marks (1928–9) as against 7500 in 1913. Taxation is extremely heavy, but G's. financial recovery is evidenced by the increase of the National income from some 41,500 million marks in 1913 to 65,500 million marks in 1928. The average income *per capita* is actually lower than the numerical average, being less than half of that in England and a third of that in America.

Education.—G. stands conspicuously foremost in the field of state education, and so far is without rival for her admirable systemisation and for the variety and thoroughness of the technical training she provides. It is established by law that every child from the age of six to fourteen must attend one of the elementary schools ('*Volkschulen*'). The Republican constitution abolished all private preparatory schools, making the public elementary school common to all. After eight years there the pupil must go to a continuation school until his eighteenth year. The continuation schools are specialised, and for higher education pupils are helped by grants from the Reich, the states, and the local authorities. A Federal Law reduced the attendance at the elementary school to four years, and it is then for the state to decide whether the child shall proceed to a secondary school or remain in the elementary. Middle and higher education has been the care of the Republic equally with the lower grades of instruction. The universities are of course the centres of intellectual life. All of these have the four faculties of theology, law, medicine, and philosophy, and many are some of the oldest foundations of their kind in Europe. Outside the country the best known are probably Berlin, Munich, Leipzig, and Bonn, which also have the largest numbers of undergraduates, and Göttingen, Heidelberg, and Jena. Four teach theology according to the Rom. Catholic doctrine, whilst in four others the theological faculty is open to both Protestants and Rom. Catholics; the remaining universities are Protestant. Three new universities have been founded at Hamburg, Frankfurt, and Cologne. In addition to the universities there are the *Technische Hochschulen*, which are state institutions of university rank, where such special subjects as architecture, engineering, chemistry, mi-

ing, forestry, shipbuilding, etc., are studied, although arrangements are also made for a more liberal education. Below these there are the *Handels-Hochschulen*, which have been set up in most of the big cities to facilitate adult education. The high standard of Ger. education throughout the grades has been maintained under the Republic, while the compulsory religious instruction, common to all schools during the empire, has been replaced by optional classes in religion at the discretion of parents.

Religion.—The Disestablishment of the Church under the new Republic helped further the decline of Church influence during the war, but the Catholic religion, being outside state control, was less affected, and has retained its influence, especially in Bavaria and S. G., although a Catholic minority exists in Prussia. Ger. Protestantism has been the result of the fusion between Lutherans and members of the Reformed Church, and after the Disestablishment the Protestants banded themselves together in the 'Ger. Evangelical Church League.'

History.—Our earliest gleanings of the tribes who once inhabited the lands now called G. come from the pages of Rom. history. It is probable that the word 'German' was adopted by the Roms. from the Gauls, and that it has a Celtic origin. As far back as 113 B.C. there is mention of certain Germanic tribes, the Cimbri and Teutones, who had to be driven back across the Rom. border. In the course of his Gallic conquests, Cæsar came up against the valiant Ger. chieftain, Ariovistus, and banished him and his followers across the Gallic frontiers and beyond the Rhine. In 55 B.C., Cæsar beat back the Suevi and Marcomanni from their settlements in modern Belgium. Thirty-three years later Drusus, by his victories over the Batavians and Frisians, etc., pushed the Rom. barriers up to the Elbe, but an attempt in the reign of Augustus to Romanise the Germanic peoples led to a patriotic rising under Arminius, the champion of the Cherusci. The rising was remarkably successful, and in A.D. 9 Varus and his legions were cut to pieces and Rom. aggression was checked. From the third century onward, the northern confines of the empire were continually threatened by the Saxons, Frisians, Thuringians, Goths, Alemanni, and Franks, tribes which now entered great confederacies against their common enemy, Rome, and which were obliged to trespass on Rom. territory by the inroads into their own territories of the savage hordes of N. folk, referred to

usually as Huns and Magyars. Henceforward, till the treaty of Verdun (843), it is useless to look for a kingdom of G., for the simple reason that it was non-existent. It was then occupied by a number of chieftains, who were perpetually at war with one another, except when invasions from without forced them into transitory alliance. Charles the Great, the Frankish king, was crowned emperor of Rome by the pope in 800, and after his death his empire was partitioned. His grandson, Lewis, received the lands between the Rhine and Elbe, which were variously known as the 'Teutonic Kingdom or Francia,' or as the 'Kingdom of the E. Franks' to distinguish it from 'W. or Latin Francia,' which later became France. This infant G. consisted not of a single people, but of a number of fairly homogeneous tribes, the Saxons, Swabians, Bavarians, Thuringians, and Franks, who might, it seems, have soon been welded together into a sturdy, prosperous nation had it not been for the mediæval dream of a world-wide Holy Roman Empire—a dream for which the mighty but ephemeral conquests of Charlemagne were largely responsible.

Descendants of the Carolingian Lewis ruled over G. till 911, when the line became extinct, and a mass meeting of the Diet, or National Assembly, arrogated to itself the privilege of choosing a king, so that from this time forward G. became virtually, at least, an elective in place of an hereditary monarchy. Their first choice was Conrad of Franconia, which was not unnatural, as the Franks were the predominant tribe. It was his successor, Henry of Saxony, popularly called Henry the Fowler, who founded the Saxon dynasty. This lasted till 1024, and was remarkable for the energy of its rulers. Henry himself reorganised the military forces by introducing cavalry, and soon grew famous as a conqueror. For the major part of his reign he was occupied in repelling continuous invasions, now of the fierce Huns and now of the Vandals or the Scandinavian Corsairs. Moreover, his far-sighted policy of fostering municipal life and of founding and fortifying towns has won for him a place among wise statesmen; for the cities grew apace, and the burghers were one day to become a mainstay of the emperor against his unruly and factious princes and nobles. His son, Otto I., was equally successful on the battlefield, and it was his brilliant victories over the Slavs, Poles, Danes, and Magyars which probably suggested to him the arrogant notion of a universal sovereignty

surpassing that of the old Roman emperors or of his Teutonic prototype, the Emperor Charlemagne. At least it is certain that in 962 he was crowned emperor of the Holy Roman empire at Rome by the pope, and that during his sumptuous coronation festival he dined with his three spiritual electors, the archbishops, and was waited on by the chief secular princes of his realm, namely, the electors of Bavaria, Lorraine, and Swabia, who were his grand-marshal, arch-chamberlain, and cup-bearer respectively. From this dates the

only at the expense of national disaster. For with their sovereign lord away the smaller kings and nobles gave free rein to their ambitions and animosities, with the inevitable result that whilst Spain and France and England were becoming consolidated realms, G., like Italy, her companion in misfortune, was the victim of a wasting process of utter disintegration. Yet some compensations attend the darkest misfortunes, and so in this case intercourse between the emperor and Rome opened out a wide avenue for the passage of the New



[German State Railways, Tourist Dept.]

THE FUGGEREI, AUGSBURG
(Sixteenth century).

tradition, to which the German rulers jealously clung, that he who had been crowned German emperor at Aachen was entitled also to be crowned king of Italy at Milan and emperor at Rome. The calamitous consequences of this empty ceremony and still more of the vainglorious assumptions of world-conquest cannot be overrated. Puffed up with pride in their vast but shadowy dominions abroad, the emperors, even the best of them, despised the G. they really owned, and turning their back on it crossed the Alps again and again to drain their soldiers' life-blood in great battles which led, it is true, to personal aggrandisement, but

Learning and of an army of scholars and manuscripts into the remotest corners of the German states. But this was not to come to pass for many centuries. Meanwhile Otto III. (983-1002) had lived and died. His was a nature of romance and splendid imagination, so that in him probably that magnificent if hollow idea of a world-empire attained its fullest embodiment.

From 1024 to 1125 G. was governed by Franconian emperors. The most noteworthy is Henry IV. (1056-1106), whose profound humiliation before the haughty Hildebrand at Canossa (1075) still remains one of the most dramatic and miraculous episodes in

history. Ever since Otto I. had received the title of Roman emperor, there had been a rivalry, which daily assumed larger proportions, between emperor and pope. In the old days the bishop of Rome had naturally acknowledged the authority of the all-powerful emperor, who was, moreover, the single Christian prince among a host of pagans. But in Henry IV.'s day the papacy was supported by a number of Christian sovereigns, among whom the German emperor was not necessarily pre-eminent. It is clear, at least, that Gregory VII. was determined once for all to assert his freedom from imperial domination. Thus disregarding the very foundations of the feudal system, which was established in G. as elsewhere, he refused to allow any officers of the church to do homage to a temporal lord, and insisted that the papacy alone should exercise the privilege of investiture. Henry exerted all his powers in opposition to Gregory, but the latter, by formally deposing and excommunicating him, made his life so intolerable that he preferred to stand for three days clothed in sackcloth and with bare feet amid the perishing snows of Canossa rather than go home without the papal pardon. The pope finally received his submission, and the question of principle was thus settled, but Gregory was afterwards forced to seek exile when Henry captured Rome (1084). The quarrel, however, did not end here: it remained a festering sore in European internal politics, and it is hard to say which side came out triumphant; for though the struggle effectually ruined the Hohenstaufen dynasty which reigned in G. from 1138 to 1254, the status and position of the pope at the close of that period suggested failure rather than victory. The most celebrated of the Hohenstaufen emperors was undoubtedly Frederick Barbarossa, or 'Red-Beard' (1152-90). His reign is famous for the historic battle of Legnano (1176), where for the first time municipalities bound themselves together against a common foe, and succeeded, moreover, in inflicting on him a crushing defeat. Frederick entertained ambitious schemes of Italian conquests, and gladly availed himself of the eternal conflicts between Guelphs and Ghibellines to further these schemes. But the northern cities in Italy were wiser than he, and sinking for the moment their feuds and enmities, they coalesced to form the Lombard league, and so defeated him at Legnano. But Frederick's successors continued his battles, and so the Guelph and Ghibelline factions, that is, the adherents of the pope on

the one hand and of the emperor on the other, spread insidiously all over the empire, so that on the fall of the Hohenstaufens (1254) even the German kingdom had become, like the Holy Roman empire, a phantom. It was now split up into over 270 virtually independent states.

There now followed an interregnum (till 1273), which is important for the formation of the Hanseatic and Rhenish leagues. In spite of continual bloodshed, the towns were growing strong and resorted to union as the one defence against the anarchy of the times, and especially against the arbitrary oppression of the barons. In 1273 began the vicious practice of selling the imperial title to the highest bidder. Theoretically, the kingship was still elective, although four secular and three spiritual princes now claimed exclusive rights to choose the emperor. Accordingly they gave the title to the Count of Hapsburg, who accordingly reigned as Rudolph I. Hapsburg was the name of a paltry Swiss principality, yet the house of Hapsburg was destined to furnish a long and illustrious succession of German emperors, for in 1438 Albert II. of Austria was chosen emperor by the seven electors, and from that date till the dissolution of the empire by Napoleon the imperial crown may be said to have been hereditary in the Hapsburg line. The electors, it should be mentioned, had had their assumed prerogative of choosing the sovereign legally confirmed by the 'Golden Bull' of 1356, which had received the sanction of the Diet. This edict must be regarded as one of the fundamental laws of the German constitution, so long, that is, as the empire lasted (till 1806).

Maximilian I. (1493-1519) was one of the last of the great mediæval rulers as he was also in another sense the first representative of a new order; for not only may he be said to have assured a permanent succession of his own family, the proud Hapsburgs of Austria, but also to have made an earnest effort towards unification and peace. Maximilian was anxious to secure an army to check the aggressions of Charles VIII. of France, and so summoned a Diet at Worms. This assembly insisted very rightly on discussing domestic before foreign questions, and the upshot was that a perpetual national peace was declared, and an imperial court, consisting of a president and sixteen representatives from the different states, was established to see that that peace was maintained. A further step towards a centralised government was the division of the empire into ten circles and districts, each with its own

body of councillors, the object of which was to enforce the execution of the imperial chamber's recommendations. Other reforms, which emanated more directly from Maximilian, were the substitution of a standing army in place of the feudal levies, and the inauguration of a police and a postal system. In the light of what followed, the solemn declaration of a national peace seems nothing short of a profound irony, but it is nevertheless of vital importance, as indicating the wishes of the German citizens and their realisation of the folly and evil of continual warfare.

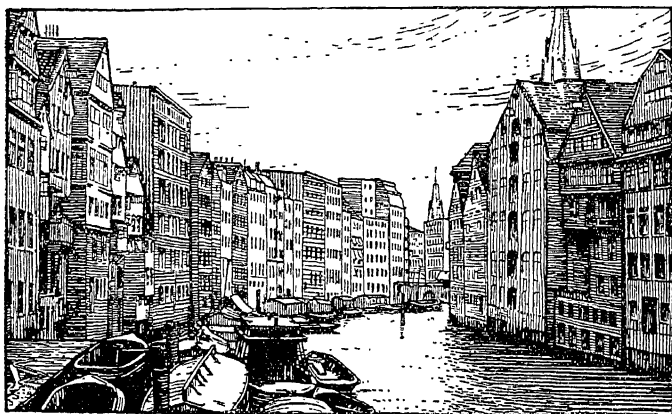
The death of Maximilian (1519) is a natural halting-place in the story of the growth of the German nation. Behind him lie the Dark Ages and in front loom Luther and the Reformation. To tell the truth G. had, for the time being, ceased to have a corporate history, and what history she had plays no vital part in the fortunes of her emperors. They treated her indeed like a neglected child, and were much more concerned in the preservation of such distant possessions as Burgundy, which was acquired in 1032, and Sicily, which was subdued by Barbarossa's son. After Maximilian the interests of the emperors seem more and more divorced from the German states; yet the steady uprising of the Free Imperial cities, which were practically little commonwealths, shows that the people were building up an active municipal life, whilst the great Gothic cathedrals, like those of Strasburg and Cologne (begun in 1248), bear a splendid and abiding testimony to the faith and religious zeal of the masses and to the presence in G. 'of that deep and pervading sentiment of the human soul which struggles with a holy and yearning enthusiasm to mount to the throne of the Most High.' But although religion was thus a vital part of the lives of German citizens, the Great Schism and the abuses produced by the sale of indulgences gradually aroused in men's minds at first a distrust and then an open contempt for the pope and for the higher clergy, whom simony and worldliness lowered in their eyes. The smouldering resentment was set ablaze by Martin Luther in reaction against Tetzel's abuse of the indulgences for the building fund of St. Peter's at Rome. This is not the place to speak of the career of this the first, and probably the greatest, Protestant reformer. Suffice it to say his ninety-five theses were printed and circulated throughout G., and that, in spite of the papal bull of 1520, and the great Diet of Worms of 1521, men of all ranks

rallied round him, so much so that a gathering of seven princes and many cities issued a formal protest against the intolerance of the Second Diet of Spire (1529) and thus became known everywhere as 'Protestants.' After Luther's death (1546), Melancthon, his friend, continued to expose the falsehoods and unreasonable character of a number of the church doctrines, but, unfortunately for the growth of the new faith the world-famous emperor, Charles V. (1519-56), exercised all his personal influence, and, what is more, employed the exceptional facilities offered by his exalted position as ruler over so many European states, completely in the service of Roman Catholicism. But before speaking of his work it is necessary to refer to the Peasants' War of 1525, as it reveals the wretched condition of the labourers and the wanton cruelties perpetrated by the German barons. The condition of the peasant of that day was hardly better than a serf's, so that, as with the French Revolution, it is not the horrors and atrocities of the rebellion, when it came, which rouse astonishment so much as the fact that men had been patient or weak enough to refrain from rebelling so long. It was a grave misfortune to Luther that the Swabian and Franconian peasants should choose a critical period of his lifetime for their revolt; for with avidity his opponents fastened on him the responsibility for the farmers' insensate if excusable actions.

The greater portion of Charles V.'s activities did not touch G., but his theory that church and state were indissoluble and his uncompromising attitude towards the Protestants, whom he conscientiously regarded as rank heretics, sowed the seeds of that frightful discord which devastated G. during the Thirty Years' War. The religious theories of the emperor would not, of course, have injured the empire very considerably had Charles been either entirely immersed in the complications which were continually engrossing his attention abroad, or if, on the other hand, he had been infirm of will or weak of purpose. But unluckily for G. neither of these things was the case. Whatever other merits Charles Quint possessed, he was indisputably a man of forceful character, who no sooner conceived a project than he straightway set about carrying it through. Thus the burden of his zeal fell heavily on his German dominions, and there seems every reason to believe the legend that one of his deepest regrets during his retirement at Yuste was that he did not put Luther to death when the latter was at his mercy in the Diet of

1521. It was during a respite from the wars with Francis I. that the Lutherans published a written statement of their doctrine which became known as the 'Confession of Augsburg' (1530). Not content with this, they proceeded to bind themselves together in the league of Schmalkald, which may be regarded as the outward expression of their determination not to submit to the Emperor. Charles was not slow to appreciate the dangers of this combination, but for the moment an event intervened which temporarily overshadowed the religious disputes. Solyman the Magnificent, the martial Turkish sultan, had already besieged Vienna (1529), and was advancing westward with

League. This proved an easy task, for at the eleventh hour Maurice of Saxony, one of the pillars of the Reformation, deserted to the imperial side, and this act of treachery led immediately to the break-up of the Protestant forces, whilst, with astonishing rapidity, the famous league melted completely away. The leaders were executed and fines exacted from Protestant cities. But the Protestant cause was not so to be uprooted. The Saxon Maurice atoned for his former desertion and Francis' successor on the French throne was eager to snatch at any means of humbling his father's rival, and accordingly lent substantial aid to the oppressed Lutherans. The second



A SCENE IN HAMBURG

overwhelming forces to attack the emperor's dominions. Charles lost no time in making a patriotic appeal to the Germans to forget their differences in the face of the common foe, and in a short time was surrounded with a splendid army, more than sufficient to intimidate the Turks. To the Protestants he had wisely granted provisional toleration by the Peace of Nuremberg. But he always intended, at the earliest opportunity, to revoke this privilege. The expedition against the Turks at Tunis (1535); the punishment of rebellious Ghent (1539-40); attacks on the Algerian corsairs and two more ravaging wars with the French king, Francis, kept him fully occupied till the treaty of Crespy (1544). But in the year of Luther's death (1546) he began his work of crushing the Protestant

revolt was attended with conspicuous success, and at the epoch-making Diet of Augsburg (1555), Charles was obliged to make notable concessions to his triumphant foes. It was arranged that in future every German prince should be allowed a free choice between the Augsburg confession—which was accepted as a summary of Lutheran orthodoxy—and Roman Catholicism, and that once his choice was made he should be at liberty to enforce his religion upon his subjects and to drive the latter out of the kingdom should they refuse his faith. This principle of *eujus regio illius religio* affords irrefutable proof of the difficulty, nay the impossibility, of sixteenth-century men grasping the idea of toleration as understood to-day. Earnest piety and a red-hot religious fervour formed

the bedrock of Charles's character, and impelled him towards actions which to-day are rightly described as those of a fanatic, but which among his contemporaries, and especially in the Catholic Church, caused him to win a world-wide reputation as the champion of the true religion who prosecuted a holy war against the foes of light and breeders of odious heresies. His policy was far-reaching, for it precipitated the subsequent religious wars and persecutions of the old religion in the new Protestant states.

Before leaving the reign of this emperor, who abdicated in 1556, it is necessary to say a word of his rivalry and struggles with the French king. The beginning of the mischief was the defeat of Francis I. when he came forward as a candidate for the empire: the electors rejected him in favour of Charles. Thenceforward Francis and Charles engaged in four useless but bloody wars, most of the campaigns being fought in Italy, which seems to have been regarded by both as their lawful prey. On the whole the advantage was with the emperor, who at the final peace secured Naples, Artois, and Flanders, though he was obliged once and for all to renounce his claims to Burgundy, which, as a matter of fact, had never since its acquisition in 1032 been attached to the empire by other than the loosest of ties. At the time these wars decimated the French and Imperial troops, but the evil of it all was that the French kings never forgot the humiliation that their predecessor, Francis, had suffered at the hands of Charles V. at Pavia (1525) and elsewhere. And it is this fact that accounts for the jealousy of the House of Hapsburg, which France ever continued to evince, and which explains primarily the vindictive policy pursued by the Bourbons and their ministers, Richelieu and Mazarin, during the Thirty Years' War, and which finally enables one to appreciate the transports of joy experienced by the French at the dissolution of the empire by Napoleon in 1806.

The foreign wars of Charles V. have purposely been passed over, as their causes and results form part of European rather than of German history. A similar course will be adopted in the treatment of that interminable and appalling struggle which lasted from 1618-48, and which is therefore conveniently known as the Thirty Years' War. It will be remembered that the Peace of Augsburg had treated the Calvinists as non-existent. Yet in G. as elsewhere many had come to prefer the confession of Geneva to that of Augsburg. The result of this was perpetual strife among the various

Protestant sects themselves; for the Lutherans showed small mercy to the Calvinists or to any reformers who ventured to follow a different creed from that drawn up by Melancthon, that is the Augsburg confession. It was these wretched squabbles among the Protestants which enabled the Catholics to make good their position, but for this the latter relied chiefly on the iniquitous 'Ecclesiastical Reservation' which was embodied in the Peace of 1555. This enacted that the penalty which every bishop or abbot must pay for turning Protestant was the loss not only of his office, but of all the lands and revenues attached to it. There was another clause also which proved a bone of sore contention. According to the Catholic view, this provided that all lands not already converted to secular uses by 1552 were to abide forever in the hands of the (Catholic) Church. But the interpretation of the Protestants was different, and their princes had no scruples in seizing ecclesiastical properties within their own territories and in appropriating them for building schools and churches for the propagation of their own beliefs and doctrines. Further, they naturally considered the 'Reservation' grossly unfair, and continued to appoint Protestant bishops to vacant sees, especially in the northern states. Such behaviour led to bitter recriminations, and gave rise to fruitful discord, which insinuated itself into a multitude of towns and villages, and disturbed the harmony of many a home hitherto blessed with happiness and peace. What further aggravated the distress was that not only was the religion of the emperor of vital importance to his people, but also that of every petty king or prince, who might each be father or despot to his subjects as he chose. A state that for many years had enjoyed comparative quiet under say a Catholic sovereign, might suddenly be handed over to the mercies of a staunch Reformer whose personal character would decide his leniency or harshness: there was in fact no security nor peace. On the whole the tyrannies of the Catholics seem to have exceeded those of the Lutherans, but that was probably because they could not forget that the latter were rebellious children who had strayed wantonly away from the parent church, and who needed only a good thrashing to recover them to their senses and restore them to the fold.

After Charles there were two moderately enlightened emperors, and then followed Rudolf II. (1576-1612), who was an ardent Catholic. Dread of oppression impelled the Protest-

ant states towards mutual alliance, and in 1603 a confederation was duly formed, called the Evangelical Union, the moving spirit of which was the Calvinist Prince Christian of Anhalt. This was followed, in 1609, by a counter-move on the part of the Catholics, who founded the Holy League, at the head of which was Maximilian of Bavaria. It wanted small additional provocation to induce these leagues to fly at one another's throats, and that provocation was given by a band of Protestant nobles of Bohemia, who, infuriated by the vacillating policy of the emperor, marched to the Royal Castle at Prague, and in a mad moment actually hurled the two imperial representatives and their secretary out of the castle window. The events which reached a climax in this act of violence may well be recalled, as they illustrate those contradictory processes which, at that period, occurred with countless variations in every German state. Rudolf II. had begun by treating the Bohemian Protestants with the utmost severity, but was at last forced to grant the feudal aristocracy absolute liberty of worship coupled with permission to build schools and churches even on crown lands, as he realised that the one alternative was revolution. At once the Protestants began to give practical effect to the privileges they had secured and to erect places of worship, but the Catholic populace were indignant with what they naturally esteemed as the double dealing of their patron, Rudolf, and consequently retaliated by closing one of the new churches and demolishing another. The Reformers wrote informing the emperor of their grievances, but got no reply, and it was then that certain rash spirits among them resorted to the drastic measures described above.

It is quite beyond the scope of this sketch to make any attempt to disentangle the intricacies of the great war on which the Germans were now fully embarked, but it is necessary to draw attention to a few of its broader features. The first chapter in the war was the utter subversion of the Protestant cause in Bohemia; the vanquished leaders who had not fled were put to death; many Lutherans were driven homeless from the state; their property was ruthlessly confiscated; and the Catholics exultantly reassumed control of all their schools and churches. The second chapter centres round the personality of Christian IV. of Denmark, who now came forward to stake his fortunes alongside those of his fellow-religionists, the Protestants. Other notable leaders on

his side were the German prince, Christian of Anhalt, and Count Mansfield, whilst ranged against them were two of the most formidable generals G. has ever produced, namely, Tilly and Wallenstein. Adversity still dogged the reformers' footsteps; Mansfield d. shortly after his crushing defeat by Wallenstein at Dessau on the Elbe (1626), and his death was soon followed by that of the German Christian; the Danish king was utterly vanquished by Tilly at the field of Lutter; the remnants of Lutheranism were wiped out from Austria as well as from Bohemia; Wallenstein swept with his plundering armies over the greater part of North G., and completed his destruction by breaking the backbone of the once flourishing and influential Hanseatic League. The year 1629 is marked by the retirement from the war of Christian IV., and also, as a striking pendant to that event, by the Edict of Restitution, which restored to the Catholics all the church properties which the Protestants had appropriated since the treaty of Passau (1552). Just when the fortunes of the latter seemed at their lowest ebb there appears a second and greater champion in the person of the Swedish king, Gustavus Adolphus, the Lion of the North subsidised from France by Richelieu. With his advent opens the third period of the war. The culpable slackness of his allies prevented his coming to the rescue of Magdeburg, which had stoutly refused to obey the Edict, and so this city was sacked (1630) and exposed to the pillage and licence of Tilly's bloodthirsty soldiers, who were, moreover, hardly responsible for their actions, so flushed were they with the splendour of their victory. Mercifully the annals of history offer few parallels to the horrors then perpetrated in the doomed and miserable city. For the time being Gustavus changed the fortunes of the day and twice defeated Tilly, first at the battle of Leipzig (1631), whilst in the course of the second engagement Tilly received a mortal wound and died. At this point Ferdinand, the emperor, who was a staunch Catholic, composed his differences with Wallenstein, who returned to the arena of bloodshed and met Gustavus on the memorable field of Lutzen (1632). Here the noble Swede fell, though his warriors carried the day.

The final chapter opened in 1635. The war had now lost its early character of a religious conflict between irreconcilable Christians, and had degenerated, or perhaps only developed, into a European contest in which the one object of the combatants was either to despoil the

empire themselves, or to hinder their rivals from territorial expansion. Louis XIV., for example, was intent on the ruin of the Hapsburgs, and accordingly lent aid to the Protestants in spite of his own Catholicism. For years the war dragged on, but at last, when all involved were worn out by the selfish, endless struggle, the peace of Westphalia was arranged, the terms of which were eminently prejudicial to the interests and prestige of the empire. France received a great part of Alsace and the three Lotharingian bishoprics, Metz, Toul, and Verdun; Sweden received important tracts of land in Northern G., although she was to hold these not independently but as fiefs of the empire, and the independence of Switzerland (which had been virtually free since Maximilian's defeat by the Swiss League in 1499) and of the Netherlands was finally acknowledged. In accordance with the religious clauses, Lutherans, Catholics and Calvinists were placed on an equal footing, but princes might still impose their own creeds upon their states, although no family could now be forcibly banished till the expiration of three years. Lastly, a crushing blow was dealt to the empire; for its dismemberment was for the time being sealed by the recognition of the practical independence of the several states, which might even contract their own foreign alliances and do almost anything short of taking up arms against the emperor. The fatal issue of the war within the Germanic confederation cannot be over-emphasised. It is said that the population fell during the brief space of thirty years from 30,000,000 to 12,000,000; the proud Hansa cities and their union were broken up; flourishing towns were levelled to the ground, their sites being marked by charred masses and scattered hovels; agriculture was hopelessly neglected, and it was hard to find a stretch of countryside not disfigured nor wasted by the brutal devastations; industries and commercial routes were obliterated, and education, science, and the fine arts belonged to a forgotten era now glorious by contrast; patriotism and hope were dead. In fact it must, in fairness, be admitted that 'in character, in intelligence, and in morality, the German people were set back two hundred years.'

It is a relief to turn from this picture of abject misery to the meteoric ascendancy of Prussia, which forms the next great chapter in German history. Prussia, the name of which was taken from the Borussi, a Slavonic tribe of fierce

pagans, lay along the Baltic coast E. of the Vistula. These had been converted, and their territory occupied by the military religious Teutonic Order. In 1525 Albert Hohenzollern the Grandmaster, declaring himself a Protestant, arrogated the land to himself as a duchy independent on Poland. In 1611 the duchy of Prussia was united with the electorate of Brandenburg, and when these territories fell into the hands of the great elector, Frederick William (1640-88), the foundation of the future greatness of Prussia may be said to have been laid. Frederick was an able ruler who determined to make himself felt in European politics. For this purpose he drilled an excellent and permanent military force, and took pains to knit his duchy well together by creating an efficient central government. Moreover, he came forward as the champion of Protestantism and made his dominions a place of refuge for the persecuted Huguenots. It was, however, in the reign of his son Frederick III. (1688-1713) that Prussia achieved the status of a kingdom. For this Frederick inherited his father's ambitions and finally succeeded in wresting from the emperor the much-coveted title of king. The latter was the more willing to grant his wish, as Prussia was beyond the pale of the empire, and especially as it was the one means of winning Frederick's support in the impending war of the Spanish succession. The secret of Prussia's advance no doubt lay in the ability of her rulers. This Frederick was succeeded by another, who was known as Frederick William I. (1713-40). In spite of his eccentricities, his passion for giants, and his 'tobacco parliament,' the new monarch proved a wise economist, a fine legislator, and an energetic if somewhat brutal tyrant, and what was of first importance to his son, Frederick the Great (1740-86), he left a thoroughly disciplined standing army of 80,000 men. Frederick the Great was gifted with a genius for war, and it was largely on this that he relied in lifting his little kingdom to the level almost of the Great Powers in Europe. When the Pragmatic Sanction of Charles VI. was disregarded and the possessions of Maria Theresa were assailed, Frederick stole Silesia. He had formerly overrun it with his army, and his claim to his conquest was acknowledged in the peace of Aix-la-Chapelle, which ended the War of Austrian Succession (1748). The Seven Years' War (1756-63) was an attempt to humble the upstart Prussia. The Empress of Austria, Maria Theresa, blazoned abroad her

wrongs, and France, Russia, Saxony, Sweden and Poland rallied round her, whilst Frederick, the robber, could rely on England alone of all the foreign nations. Notwithstanding what seemed a hopelessly unequal contest, Frederick managed to defeat the French at Rossbach, the Austrians at Leuthen, and the Russians at Zorndorf. These victories forced Europe to recognise that she was face to face with one of the world's great conquerors. But Frederick was doomed to taste the bitterness of defeat. His one ally deserted him, and soon the outlook was so black that he carried poison with him everywhere to put an end to existence when further resistance was quite useless. But he was saved from such a wretched end by the accession to the Russian throne of Peter III., who was his enthusiastic admirer, and who is reported to have said: 'Together we will conquer the whole world.' Victory once more attended the Prussian armies, and thus, at the peace of Paris (1763), Frederick came well out of an exasperating war. Till the year of his death (1786), Frederick continued to evince his equal power to conquer and to rule. In the story of the evolution of German nationality, his share in the scandalous partition of Poland is forgotten, and the fact that in creating a robust and unified Prussia he was at the same time making a centre round which the other members of the German confederacy might crystallise alone is remembered.

During the next epoch the historical arena is filled with the rivalry between Catholic Austria and Protestant Prussia—a rivalry for which the consistent policy of the successive Fredericks had paved the way. But the bitter struggle which grew out of this rivalry was for the moment obscured, as so much else was, by the radical disturbances in the map of Europe for which the world-conqueror, Napoleon, was responsible. His supreme victory at Austerlitz (1805) was the death-knell of the Holy Roman Empire, and Ferdinand II., in 1806, was obliged to content himself with the much less pretentious title of Emperor of Austria. Thus the long Hapsburg ascendancy over G. was brought to an end. The victories of Jena and Auerstadt (1806), by which the newly-fledged kingdom of Prussia was laid low, had an issue purely destructive. The confederation of the Rhine, that is, a union of sixteen German states under the protectorate of Napoleon, was short-lived. The year 1815 saw the federation of thirty-nine petty kingdoms under the presidency of the

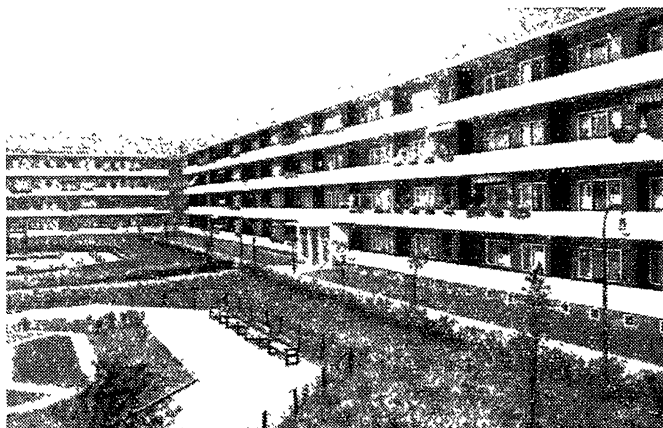
Austrian emperor. The states of the league were all to set up constitutional governments and to share in common a representative Diet and a standing army. But, unfortunately, the ruling powers, that is, the dukes and princes, etc., were, as at the time of the great Revolution, quite inimical towards the desired reforms, and obstinately refused to set up popular systems of governmental control. At the time of the Revolution in France, July 1830, there was a sympathetic wave of revolt in many quarters of G., but it was not strong enough to extort any lasting concessions from the various courts. It was expediency and self-interest which, as has happened again and again in history, finally made inevitable the attainment of a solid and permanent good—in this case a consolidated nation; for the several states, with the exception of Austria, entered into a commercial treaty with one another by which they agreed to set up no protective barriers between themselves, but to encourage free trade everywhere within German boundaries. This treaty grew into the famous Customs Union, or 'Zollverein.'

Once again in 1848, as in 1830, German patriots were stirred to open demonstrations of their dissatisfaction with the existing state of affairs by the tidings of the summary dismissal by the Fr. of the reactionary Louis Philippe, and their inauguration of another commonwealth. This time the Ger. uprising bore better fruit. The govts. of the smaller states were at once intimidated into carrying into effect a series of liberal measures, but in the two chief kingdoms of Austria and Prussia reform was not to be won so easily. Indeed, it was only after blood had been spilt that the emperor and king tendered an unwilling submission. In Austria the Conservative Prime Minister, the redoubtable Prince Metternich, was obliged to flee the country, and a representative Diet was summoned whose members were chosen by a popular suffrage. The same process was gone through in Prussia; a national assembly was convened and Frederick William IV. swore to observe the new constitution. But a still more promising experiment in federation was the convocation at Berlin in 1848 of an assembly representative of all the Ger. states to take the place of the now effete Diet. This assembly ended in failure; for it was the scene of endless quarrels between the Austrian emperor and the Prussian king, and finally the states began one by one to recall their delegates, as they

despaired of good proceeding from a body so much at enmity within itself. Yet in extenuation of this mishap, it should be remembered that it served as a rough school in which members, all of them inexperienced, could learn their work as law-makers for a nation.

To pass on rapidly to the next event of prime importance—William I. ascended the Prussian throne in 1861, and it was not long before he had advanced the astute and vigorous Bismarck to the premiership of his kingdom. The methods of this statesman were rough and ready. He had long made up his mind that the sword only could cut the Gordian knot tied by the mutual

the heavy defeats at Magenta and Solferino which Italy had inflicted on her, and that this power was now in arms once more against her on the side of King William. It was a war hastily entered on and hastily concluded. In the August of the same year (1866) the peace of Prague was signed, and Austria paid the penalty of her successive defeats, which had culminated in the historic battle of Sadowa (in Bohemia), by being debarred once and for all from participation in the 'German Union.' It should be mentioned that this union had been formed as early as 1849, whilst Austria was preoccupied with quelling the Hungarian rebellion



[German State Railways, Tourist Dept.]

TYPICAL MODERN GERMAN FLATS

jealousies of his country and Austria, and eagerly seized on the miserable disputes about the duchies of Schleswig-Holstein as an efficient *casus belli*. Prussia was determined to annex Holstein, when the royal house of Denmark, which had so far held it as a foreign dependency, became extinct in 1863. The duchy was useless to Austria, but the latter, nevertheless, could not brook any annexation which would aggrandise her rival. War actually broke out in 1866. Most of the smaller states had flocked to the Austrian standard, and as the dominions of the allies had about three times as large a population as Prussia, it seemed at first as though the latter would be wiped out. But it must not be forgotten that Austria had not yet recovered from

headed by Kossuth. It was, in short, a federation of a number of the states which agreed to recognise the supremacy of Prussia. The main object of Austria in engaging in the campaign of 1866 had been to aim a death-blow at this union. The year after the war (1867) this earlier federation was enlarged so as to merit the title of N. German Union. Frankfurt, Nassau and Hanover were now part of Prussia, and the only kingdoms of importance still outside the union were Bavaria, Baden and Württemberg, that is the Catholic states of the S. These still held out because they disliked the idea of having a Protestant kingdom at their head, and also because they objected to the repressive and despotic policy of Bismarck. But, as was the case in Greece

when Athens and Sparta sank their mutual hostilities so as to present a bold front to the Persian invader Xerxes, so among these discordant Ger. principalities it was the surge of patriotic feeling issuing from the knowledge that a Pan-Ger. army was besieging Paris that finally broke down the resistance of the recalcitrant states and forced them into the great Germanic confederation, which, in 1871, was recognised by Europe as an empire and, what makes the conception of empire sink into insignificance, as a nation. But this is anticipation. It is necessary to understand what occasioned the united resistance against a common danger. The Franco-Prussian War (1870-71) was really the climax of that perpetual enmity on the part of the Bourbons against the Austrian Hapsburgs, an enmity which was somehow transferred to the Hohenzollern dynasty of Prussia when that kingdom began to overtop the older seat of empire. A pretext for the commencement of hostilities was offered by the gift of the Spanish throne to Leopold, a member of the house of Hohenzollern, in 1870. In deference to the Fr. king, Napoleon III., Leopold did not accept the proffered crown, but thereupon, after the manner of the wolf in the fable, Napoleon demanded a guarantee that no Hohenzollern ever should unite together Spain and Prussia, a foolish demand which was naturally refused. The Ger. forces were better trained and better armed than the Fr., and success attended them everywhere. Thus they blockaded one Fr. army in Metz, forced another to surrender at Paris, and besieged a third in Paris. The capital fell, and the peace of Frankfurt ended a war which had proved nothing but humiliation to the defeated. Alsace and part of Lorraine became Ger. once more, after being Fr. for over two centuries, and France had to pay an enormous indemnity of £200,000,000, which crippled her finances for years. But ere Paris had yielded or the war was at an end, King William I. had received from all the princes and free cities of G., whilst he was in the great hall of Louis Quatorze at Versailles, the proud title of emperor over a united G. which had at last found the door to freedom in confederation.

The man who mapped out the path of advance for the young empire was undoubtedly Prince Bismarck, who became Reichskanzler or Imperial Chancellor (1871). Broadly speaking, his aims were to concentrate all power in the person of the emperor and to fortify his dignity and

the dignity of the empire by diverting as large a portion of the national expenditure as he dared towards enlarging and increasing the efficiency of the army. But he was also called on to deal with the Socialists, who were constantly in revolt against his administration, and in the procedure he adopted he proved himself a wise statesman; for it was Bismarck who saw that the most effective means of disarming the Socialists was to remedy the evils against which they cried. Thus, those measures for compulsory insurance of workmen and for old age pensions, etc., measures which are sometimes described as state-socialism, were really the outcome of the chancellor's recommendations. Bismarck's first battle was with the pope. In 1872 the Jesuits were expelled, and during the next three years the famous Falk or May Laws were promulgated, their object being to undermine papal authority and to establish the legality of state interference in ecclesiastical affairs. In 1874, moreover, the validity of civil marriage was upheld. This struggle is known as the 'Kulturkampf,' and the title 'Falk' refers to the minister who drafted the anti-church bills. The former ended in compromise, for in 1879 Falk was forced to resign, and Bismarck was later obliged to make substantial modifications in the laws.

The contest between the Reichstag and the Chancellor as to whether or not the former should retain a constitutional control over the army centres round the 'Septennal' (1874), by which the army grants were fixed for periods of seven years at a time. The second period would expire in 1888, and Bismarck was determined to make very considerable additions to the peace establishment in view of the rapid increase of the Fr. military forces. Parliament stubbornly refused to countenance his plans, and accordingly was dissolved in 1887. There followed an election of tremendous excitement, the net consequences being that the states gave a striking testimony of their confidence in the 'Iron Chancellor,' and his opponents, the Socialists and Radicals ('Freisinnigen'), suffered a humiliating defeat. Bismarck accordingly triumphed; subsequent budgets showed an enormous increase in army supplies, and the obligations to serve was extended from twelve to eighteen years (1888). Conscription had one very serious drawback, and one which Bismarck tried to remove when in his famous speech of 1885 he declared that 'G. does not want colonies'; the extraordinary increase each year in the number of emigrants, most of

whom found new homes in America, seemed for the time being (1879-1884) to threaten the home country with grave depopulation. In spite, however, of Bismarck's dictum, G. had aspirations towards colonial expansion. In 1882 a German colonisation society was started at Frankfurt, and from that time date the German acquisitions in Africa and the Pacific, but the colonies did not, unfortunately, prove a successful enterprise from the financial standpoint. Naturally the task of meeting the national expenditure, which increased annually almost by leaps and bounds, soon developed into a problem of the first importance, but for this problem as for so many others the indefatigable Bismarck was ready with a solution. The whole of the 1879 session of the Reichstag was exhausted by an animated controversy between Free Traders and Protectionists. Victory fell to the latter, and Bismarck's suggestions were in the main adopted. Indirect taxes multiplied; the income from excise and customs rose from £11,500,000 in 1878 to £35,000,000 in 1899, and most important of all, G. was definitely committed to Protection. In connection with the Chancellor's financial schemes may well be mentioned his interest in the nationalisation of the railways. By 1896 this great work was practically complete, and those who completed it would be the first to acknowledge that in placing them under state control they were merely following in Bismarck's footsteps.

Finally, Bismarck showed himself an adept in diplomacy. Here he was allowed a free hand, and thus was relieved of those vicissitudes which were a constant menace to his domestic schemes. Ever since the meeting of the three emperors in 1872 there had been an alliance between G., Austria and Russia, but after the upheavals in the East, G. was obliged to chafe between the friendship of her two former allies. Thus in 1879 Bismarck publicly renewed amicable relations with Austria, and when Italy agreed to join the two empires in 1883, there was constituted a Triple Alliance which lasted down to the Great War. In his choice Bismarck was guided by the consideration that with Austria at his back there would be less danger of a combined attack of France and Russia.

In 1888, the Emperor, William II., the grandson of the first German Emperor William I. (1871-88), ascended the throne with the determination to continue his grandfather's and Bismarck's policy. But it soon became clear that two strong personalities such as himself and Bis-

marck could not work together, and as he could not submit to the latter's contention that the Chancellor must always be the intermediary between the emperor and his other ministers, he commanded Bismarck to send in his resignation (1890). Caprivi now became Chancellor, and managed to negotiate a series of commercial treaties with the countries of Central Europe (Austria, Belgium, Switzerland, Italy), and later with Serbia and Rumania, the purpose of which was to lower the import duty on corn on condition that the foreign states favoured German manufactures (1892-94). These treaties at once induced the peasants to combine and in 1893 a great agricultural union was formed, that is, the 'Bund der Landwirte,' with which an older association, the 'Deutsche Bauernbund,' almost immediately coalesced.

To understand these events it is necessary to realise that G. was weathering a great crisis not unlike that through which Great Britain passed in the earlier nineteenth century. The rural populations were jealous of the industrial, whose importance had long since overshadowed their own in the eyes of the commerce-loving Reichstag. Thirty years before home-grown corn had sufficed the needs of the empire, but now wheat and other food-stuffs were freely brought into the country from America as well as from Russia and Rumania, and the farmers saw nothing but ruin before them unless something could be done to keep out foreign supplies. As the natural result of their loud-voiced complaints and the general discontent an 'Agrarian party' was formed, and in parliament their interests were represented by the 'Wirtschaftsvereinigung.' This new party acted for the most part in conjunction with the Conservative, and together they succeeded in hampering to a grave extent the carrying through of governmental schemes.

Another wave of popular feeling which lifted high its head in the twilight of the nineteenth century was that which rose against the strengthening and reinforcement of the provisions of the Criminal Code known as the 'Umsturz-Vorlage.' A Conservative gov. attempted to remedy the prevailing indifference to Christianity, which was undoubtedly accompanied by alarming immorality and licence, by a number of restrictive measures introduced as amendments to the old Criminal Code. Unfortunately these amendments were so framed as to interfere largely with the freedom of the Press and the personal liberties of the people, which

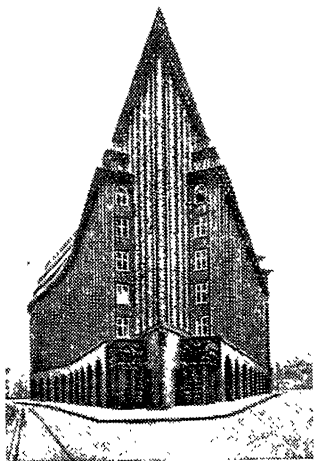
it is always dangerous to assail. The proposed censorship of pictures, books and papers gave rise to a storm of indignation, and when in 1900 the 'Lex Heinze' was brought forward to cope with what is here known as the White Slave Traffic, and to it was appended another bill proposing to give the police censorial powers over art and literature, public feeling ran so high that the Socialists were actually applauded for introducing obstructive tactics into the Reichstag, and the objectionable clauses had all to be withdrawn. It was against the Socialists, or rather the Social Democrats, that the emperor and gov. turned their strongest weapons. The blow delivered against the thousand and one political communities and organisations, most of which were socialistic in tendency, was a glaring failure, as the imperial law of 1899, to the effect that 'societies of every kind might enter into union with one another,' clearly showed. Indeed the Social Democrats, whom Mommsen declared in 1901 to be 'the only great party in G. which has any claim to political respect,' embracing as they did a very considerable latitude of opinion ranging between Moderates and followers of Karl Marx, were very obviously in the ascendant, as the elections of 1912 showed, and might without exaggeration, be said to have included the mass of the working-classes in the Protestant states.

It remains only to note one other salient feature of modern G., and that is her naval policy prior to the Great War. The emperor conceived the idea that G. was a world-empire, and must have a great navy to defend her trade and exports, on which her whole prosperity depended. This desire for naval expansion was stimulated by the knowledge of the huge fleet which England possessed; for it was felt that, as things were, the supremacy of the latter at sea would confer upon her an overwhelming advantage in the event of open hostilities breaking out. The causes of German antipathy towards England were not far to seek. To begin with both countries had had a similar industrial development; only as Great Britain had almost a century's start in the field of foreign trade and of manufactures, there was in G. the natural jealousy of her rival competitor. Moreover, the Liberal party in G., which played so conspicuous a part some forty or fifty years before, was always looking across to Great Britain as the seat of liberty and constitutional gov.; it was part of Bismarck's policy to create a revulsion of feeling and to turn this

respect and admiration into jealousy and contempt, for whereas Great Britain upheld Free Trade he had adopted Protection, and whereas her system of rule was purely parliamentary he had determined to give the Ger. constitution a solid military basis and to make imperial control a thing of reality and force. However this may be, it is patent that this antipathy reached a fever heat at the time of the Boer War, and largely accounts for the ease with which the Navy Bill of 1900 was passed, in spite of alarming increase in the naval estimates. Throughout the war the sympathy of the Gers. was entirely with the Dutch colonists, who were, of course, Low Ger. in origin, and accordingly every one of their victories was regarded as a triumph for the Teutonic civilisation. It is not necessary here to repeat the figures of naval expansion which have already been quoted earlier in the article. In the year 1913 it seemed that the relations between Great Britain and G. had improved, and hopes were being widely expressed that some arrangement between the govts. might be come to by which the race in naval armaments might be checked, but the Ger. Army Bill of March 1913 raised the total of the forces by 145,000 and put their peace strength in 1914 at some 870,000. The Ger. Chancellor could not yield to Winston Churchill's suggestion of 'a naval holiday.' There were also the beginnings of fiscal discontent in G. which could be overcome only by invoking an extreme patriotism. During the Austro-Serbian crisis after the murder of the Archduke Ferdinand at Sarajevo, G. refused to aid Austria against Serbia, but endeavoured to prevent Russia mobilising in aid of Serbia. There was, however, in G. a division between the diplomatists and the soldiers, and at an important Council Meeting at Potsdam on July 29, 1914, the latter evidently triumphed. Immediately after this meeting the Ger. Chancellor made overtures to the British Ambassador to secure British neutrality, but the 'infamous proposals' were rejected. On July 31, G. demanded complete demobilisation of Russia within twenty-four hours, but did not require the same measure from Austria. Receiving no reply from Russia, G. declared war on Aug. 1. France stood by her alliance with Russia, but G.'s declaration of war against France did not arrive until Aug. 3. The neutrality of Belgium and Luxembourg was violated by the Ger. armies, and England receiving no assurances, declared war on G., Aug. 4. See WAR, THE GREAT.—EVENTS IMMEDIATELY PRECEDING OUTBREAK

OF WAR—*Diplomatic Exchanges.* The Ger. people showed a remarkable unanimity over the question of war, propaganda concerning the Russian mobilisation rallying all parties, including the Socialists, to the support of the Gov. policy. As the war progressed, the conflict of opinion between 'Easterners' and 'Westerners' became more marked, and the rivalry between the E. and W. commands was a handicap to Ger. military aims. After the Battle of the Marne had stalemated the Ger. offensive in Flanders, it was in the E. that Ger. arms were spectacularly successful. The Russians were defeated at Tannenberg, and Rumania in 1916 was put out of the war almost as soon as she had entered it. After the Marne, Moltke was succeeded by Falkenhayn as Minister of War, but in the rivalry between him and the victors of the E. Front, Hindenburg and Ludendorff, he succumbed. Ludendorff became a virtual dictator. Both the Kaiser and his Chancellor, Bethmann-Hollweg, took second place. In the Reichstag Bethmann-Hollweg had little influence, the only strong man in the gov. being the financier, Helfferich. Meanwhile, the Socialist Minority, opposed to the continuation of the war, was increasing. Early in 1916 Haase openly announced in the Reichstag his disagreement with the policy of the gov. However, on May Day, 1916, Liebknecht, who, with Rosa Luxemburg, was the author of the celebrated *Spartacus Letters*, was arrested and imprisoned. Moreover, the Auxiliary Service Bill which was passed at this time impressed all men between the ages of seventeen and sixty into the service of the state. Diplomatically, however, G. no longer looked forward to a decisive military victory. Peace negotiations were tentatively proposed by the Ger. Chancellor on Dec. 12, soon after the defeat of Rumania. The peace offers were rejected by the Allies, and the intervention of President Wilson as arbitrator was cut short by the decision of the Ger. militarists to pin their faith to the submarine. The 'sink-at-sight' U-boat campaign which brought America into the war against G. was at first comparatively successful, and this, combined with the disaffection of Russia, made Ger. prospects bright at the beginning of 1917. Austria, however, since the death of Francis Joseph in Nov. 1916, was anxious for peace, but the Emperor Karl was unable to come to terms with Italy, and Austria was forced back into line with G. (*See also AUSTRIA-HUNGARY.*) In domestic affairs G. was troubled. In

June 1917 Bethmann-Hollweg was ousted by the military party and was succeeded by the even more ineffective Michaelis, who was shortly after replaced by Count Hertling. The Socialist agitation towards peace and parliamentary reform was now joined by the Majority Socialists, hitherto loyal, represented by Ebert, Scheidemann, David, and Müller, who were opposed to both annexations and indemnities. The Minority Socialists, represented by Haase, Bernstein, Ledebour, and Kautzky, wished, in addition, to compensate Belgium and to



[German State Railways]

A STRIKING BLOCK OF MODERN OFFICES IN HAMBURG

take a plebiscite in Alsace-Lorraine. In the beginning of 1918 there was a strike in the munition factories, fostered by the Independent Socialists and Spartacists. It was suppressed, but by June it was admitted by Von Kuhlmann, Secretary of State for Foreign Affairs, that the war could not be ended by a military success. Admiral Tirpitz formed a 'Fatherland Party', but its influence was not great enough to resist the forces disrupting the empire. At the eleventh hour Prince Max of Baden was called upon by the Kaiser to form a Cabinet to overthrow absolutism and introduce parliamentary gov. After the failure of Ludendorff's final offensive, Prince Max signed the petition for an armistice. On Nov. 5, 1918, conditions

were announced, and included evacuation of all occupied territory, withdrawal beyond the Rhine, together with a neutral zone on the right bank, and the surrender of all guns, aeroplanes, and ships. The naval mutiny at Kiel which had broken out on Nov. 4 marked the collapse of the will to war, and on Nov. 9 a Republic was proclaimed in Berlin. The same day the Kaiser abdicated and fled to Holland. A provisional gov. under Ebert replaced that of Prince Max, and the terms of the Armistice were accepted. The Majority and Minority Socialists united in this gov., and a cabinet of six was formed, called the Council of the People's Commissaries. Opposed to them were the Workers' and Soldiers' Councils animated by the Independent Socialists and the Spartacists (Communists). At a meeting of representatives from the State Assemblies, Ebert endeavoured to pave the way for the National Assembly which was to meet to decide the Constitution. The date of meeting was fixed for Feb. 14, 1919. The Spartacists were against the holding of a National Assembly, being in favour of a Soviet régime, and a conflict became inevitable. Noske, a member of the People's Council, accepted the task of upholding the bourgeois republic against the Communists. The forces at his disposal were small, but he trained others. On Jan. 5, 1919, there was a rising of the proletariat which would have succeeded in overthrowing the gov., had the leaders shown greater decision. A Revolutionary Committee did indeed set up a gov., declaring Ebert to be deposed. On Jan. 10 Noske's troops took command of the city. There was severe fighting, during which Rosa Luxemburg and Liebknecht, the leaders of the Spartacists, were brutally killed. On Jan. 19 the election was held for the National Assembly, which was summoned to meet on Feb. 6. The Assembly met at Weimar, and after deliberation and amendment the Provisional Constitution was adopted. Ebert was elected President, while Scheidemann formed a Coalition Cabinet, containing eight Majority Socialists, four Democrats, and three of the Centre Party. The new gov. attempted some financial rehabilitation, but all measures were unstable, pending the presentation of the Allied terms of peace. These were received by G. on May 7. There was an immediate outcry against their acceptance. They involved tremendous sacrifices of territory, the payment of reparations in money and produce, and also complete disarmament. The Independent Socialists were the only party

in favour of unconditional acceptance. Scheidemann, believing the Reich to be doomed in either event, resigned on June 19. Bauer (*q.v.*) formed a gov. for the purpose of accepting the terms with reservations over the question of the admission of G.'s war guilt and the surrender of the so-called 'war criminals.' He obtained sufficient support with the help of the Socialists and the Centre Party. The Allies rejected the reservations, and demanded unconditional acceptance. This was at length forthcoming, and G. signed the Treaty of Versailles (*q.v.*), which came into force from Jan. 1920. The terms of the treaty were so severe that the gov. which had accepted them became unpopular in the country, and this unpopularity was fostered not by the Communists, whose hopes had been destroyed at Weimar, but by the reactionaries—disbanded soldiers and royalists. A counter-revolution, known as the Kapp Putsch, was set on foot on March 28 by Dr. Kapp and General Luttwitz. Ludendorff lent his countenance to the movement, but Kapp's initial success was short-lived. For a week he acted as Chancellor, the Ebert-Bauer gov. having fled to Stuttgart, but Berlin was isolated by a general strike, and Kapp was put to flight. A similar movement overthrew the Bavarian Gov., but the leader, Hitler, who planned to march on Berlin, did not find his chance until ten years later, when in the elections of 1930 he put himself at the head of the 'Nazi' Party and combined with the Nationalists in an attempt to create a Fascist G.

After the Kapp Putsch the Chancellor Bauer lost his prestige, and was succeeded on May 27, 1920, by Müller, with Wirth as Finance Minister. The Müller Gov. paved the way for the General Elections of June 6, in which the Socialists lost considerable ground. A Coalition Gov. was formed on June 20, with Fehrenbach as Chancellor. The principal work of this Ministry was in connection with reparations. G. received the estimated Allied demands at the Conference at Spa in July, and ever since the question of reparation payments has dominated the foreign policy of G. (See under REPARATIONS.) At this time also the Allied demands for disarmament to within the treaty limit of 100,000 men became pressing, and were the basis of the Paris terms of Jan. 1921. They were countered by a widespread secret traffic in armaments and the formation of societies devoted to the purposes of military training. Foreign affairs at this time centred also on the Silesian plebiscite in which G. polled some 700,000 votes

to Poland's 500,000, while 664 communes were for G. and 597 for Poland. G., however, was disappointed by the boundary line which the League of Nations eventually drew through the district, the Allies being unable to agree among themselves. In May the London Ultimatum with respect to reparations was presented to G., and Wirth succeeded Fehrenbach as Chancellor of a gov. prepared to accept the ultimatum. As a result, however, of the Silesian award and the fall of the mark consequent on the effort to meet reparation requirements, G. by July 1922 was no longer able to cover her obligations, and the following year the Ruhr district was occupied by Fr. and Belgian troops. (See under RUHR.)

This drastic move, however, had been preceded by Allied conferences, the chief of which was at Cannes at the beginning of 1922, but the effort to recognise G.'s limitations was thwarted by the recall of Briand to Paris. At the Economic Conference at Genoa which followed in April, G. secured some definite result by concluding a treaty with Soviet Russia, renouncing mutual indemnities and conceding economic advantages, and this treaty further antagonised the Fr. The Ger. policy of passive resistance to the Fr. occupation of the Ruhr was initiated by Chancellor Cuno, who succeeded Wirth on Nov. 11, 1922. With the failure of the Ger. policy in the Ruhr to secure anything except impoverishment of the country, Cuno went out of office, and Stresemann came forward and formed a Cabinet in Aug. 1923. The problems which confronted him were to liquidate the struggle in the Ruhr, to restore internal order, and to stabilise the mark. The order for passive resistance was withdrawn on Sept. 27, and this step was only opposed by Bavaria where a separatist movement was aiming at the restoration of the Bavarian monarchy and the overthrow of the Ger. Republic. It assumed serious proportions, but was divided into two parties, one purely monarchist under von Kahr, the other Fascist under Hitler and Ludendorff. Owing to this division the plans of both parties miscarried. (See under BAVARIA.) In Saxony also there was a revolt against the Reich on the part of the Communists, and a Republican Proletarian Gov. was set up. Stresemann issued an ultimatum, ordering this gov. to resign, and appointed a Military Commissioner with dictatorial powers. To cope with the financial problem, Stresemann inaugurated a Powers Bill which would give him special powers to act on his own initiative while keeping within the

bounds of parliamentary gov. After resigning formally and returning with a new Finance Minister in Dr. Luther, Stresemann passed the Bill. The mark was then 'stabilised' by the method of abolishing the old currency and substituting a new one. The introduction of the *rentenmark* scheme was retarded by a strike, and it became necessary to appoint General Von Seeckt dictator. Through his efforts the activities of the Ger. Fascists and Communists ceased to interfere with the state. Eventually in Nov. 1924, Wilhelm Marx, Chairman of the Ger. Centre Party, formed a Cabinet, with Stresemann as Foreign Minister. A Second Powers Bill was passed. Economic stabilisation was further helped by the introduction of the Dawes Plan (*q.v.*), which secured the evacuation of the Ruhr and put the question of reparation payments on an economic basis. The London Conference in 1924, at which the Dawes Plan was adopted, paved the way for the Locarno Treaties (*q.v.*) the following year, and for G.'s entry into the League of Nations, in Sept. 1926.

On Oct. 20, 1924, the Reichstag was dissolved, and at the subsequent elections in Dec. the extremist Communists and Nationalists both lost a number of seats. During this period of transition towards more stable conditions, President Ebert died on Feb. 28, 1925. According to the Constitution the President must be elected by direct vote and an absolute majority. General von Hindenburg was put forward as a candidate, and although this appeared a reactionary move, he was elected to the Presidency, in which office he has remained for his full term, and it is probable that he will stand for re-election in 1932. Hindenburg, pledged to uphold the Republic, has exerted his utmost to reconcile the Royalists with the Republicans. At this time Luther was Chancellor, and Stresemann, who was Foreign Minister, concluded the Locarno Treaties with Fr., Belgium, Great Britain, and Italy. Before these treaties were ratified by G., however, Luther's Gov. was forced to resign, but was returned a month later, Jan., 1926, Stresemann again being Foreign Minister. The Locarno Treaty was followed in April 1926 by a treaty with Soviet Russia much in the spirit of Locarno, but giving assurances that G.'s treaties with the W. Powers were not directed against Russia. Several of G.'s ambitions at this time have been fulfilled: the Dawes Plan has been revised and superseded by the Young Plan, the Rhineland has been evacuated, and an economic Customs Union with Austria is now (1931) under discussion. The questions of

Danzig and the Polish Corridor remain a thorn in the side of G. It was on the election cry of treaty revision that Hitler and the Nationalists were able to gain ascendancy in the 1930 elections. It is impossible to forecast the future of G., which is in a period of violent transition. The year 1931 has been marked by the declaration of a 'state of siege,' proclaimed under the emergency powers of the President. Exceptional powers for the suppression of political violence have been granted the states, and directed not only against the National-Socialists (*Nazis*), but also against the Communists. Against both, however, after the dissolution of the Reichstag in March, Chancellor Brüning and Wirth, Minister of the Interior, have opposed a firm front, and with them the future of the Republic seems assured.

Language and literature.—Ancient G., like other European nations in the years of their infancy, spoke a number of dialects, all of which grew out of the Aryan family of tongues. Most of these dialects may be affiliated to one of two branches, High German and Low German ('Hoch-Deutsch,' and 'Platt-Deutsch'), and both of these can be traced as far back as the seventh century. Besides these, evidence is afforded by the fourth century Gothic translation of the Bible, undertaken by Bishop Ulfilas, of a dialect quite independent of either of the two groups mentioned above. To-day High German dialects are split up into the Swabian, commonly spoken in Württemberg; the Alemannic, spoken in Southern Baden, Alsace, and German Switzerland; and the Bavarian, which is the every-day language in Bavaria, Upper and Lower Austria, Styria, Tyrol and Salzburg. The so-called Middle German dialects, the Franconian, Thuringian, Silesian, and Saxon, really belong to the High German stock. The Low German branch, on the other hand, comprises Old Saxon and Lower Franconian. In the former dialect was written *Der Heriland*, which is a Christian epic of the ninth century, and the celebrated *Reinke Fes* (c. 1490) is in a dialect developing from Old Saxon. The latter is father to the modern Dutch and Flemish. The modern dialects, known as Frisian and 'Platt Deutsch,' are relics of Low German. The names High and Low originally described the geographical areas where the different branches were spoken, that is, broadly speaking, Southern and Northern G. The disintegration of the empire into separate kingdoms offers an obvious explanation of the fact that rival

dialects lingered so much longer in G. than, say, in England. But from the Reformation period, when Luther translated the Bible into a language which was a composite of various forms of High German, the doom of the other branch, at least as far as literature was concerned, may be said to have been sealed.

Literature.—The primitive German peoples fed their natural love of literature on old legends, heroic sagas, and 'beast-epics' (Thier-epos), the atmosphere of which was invariably pagan and bloodthirsty. The virile and splendid animal satire of *Reinke Fuchs*, which fastened itself so firmly on the popular fancy, and which was retranslated into German from the French, was probably compiled originally out of one of these 'beast-epics.' As in England during the Norman period, the native tongue was under the Saxon emperors left entirely to the people, being supplanted at court by Latin, then the language of cultured social intercourse. But the fullness of mediæval life soon inspired men to write of it in their vernacular. The ideas of chivalry, the pageantry and splendour of the courts, the spirit of faith, and also of adventure, both of which were quickened by the stirring episodes and Eastern glamour of the crusades, all combined to instil fresh vigour into the common peoples, with the result that in G. there sprang up the 'Minnesinger' (Singers of Love), who correspond to the troubadours of France and the Welsh and Irish bards. During the thirteenth and fourteenth centuries these men roamed from castle to castle telling fragments of the great cycles of romance and singing little songs of love and passion. Many of these wandering poets were knights and men of courtly breeding, and it was from their lips that the country folk learnt of the deeds of the great Alexander or Charlemagne, or of the exploits of King Arthur and his Table, or of the Sangrael, or of the Danish hero, Beowulf. But far above these tales of romance there tower the immortal *Nibelungen Lied*, and *Gudrun*. It was to this mine of national and heroic saga that Wagner naturally turned when he dreamed of founding a national opera, and it is here that the epic and tragical grandeur of pagan folk-lore find its noblest expressions. The names of a number of the minnesingers are still remembered with honour, among them Heinrich von Veldeke, Gottfried of Strasburg, and Hartmann von der Aue. It is important to note that in the thirteenth century laws began to be couched in the native German instead of in Latin, as is clear from

the two famous collections, *Sachsenspiegel* (1230) and *Schwabenspiegel* (1270). This displacement of Latin is important, for the fact that the monks wrote a mass of scriptural paraphrase and religious poetry in the classical tongue seemed for the time being to stigmatise German as unworthy of literary usage.

The fifteenth century was fruitful in all kinds of truly popular literature. Thus passion plays and mysteries roused dramatic interest up and down the country and familiarised men in a most delightful manner with the leading figures of biblical story: 'Volkslieder,' or national ballads, appealed to the inborn sentiments of patriotism; prose was for the first time handled with success in the romantic and wonder-telling 'Volksbücher,' such as *Tyll Eulenspiegel*, *Dr. Faust*, and *Die Schildbürger*, whilst the degeneracy of the Catholic Church offered a rich field both for mocking satires and serious theological discussions. Moreover this and the following century were the age of the craftsmen-poets or 'Meistersänger,' the best known of whom is Hans Sachs (1494-1578), the cobbler of Nuremberg and the author of the metrical *Schwänke* and *Fastnachtsspiele*. These men were already associated into guilds for their trade, and conceived the quaint notion of founding also guilds of poetry, which should draw up a strict code of rules for the composition of correct and model verse. Hans Sachs and his company lived through the intellectual revolution which took shape both as the humanistic movement and as the Reformation, but the greatest benefactor to literature was assuredly Martin Luther, who was at the same time the pioneer in the new religion. His German Bible (1522-34) has already been referred to, but when it is remembered how with amazing rapidity this book found its way even to the most insignificant towns and solitary households, and further how eagerly it was read and re-read by every thinking individual whose mind was stirred by doubts as to the truth of all the church had asked him blindly to believe, it will be admitted that too much stress cannot be laid on its position as a milestone along the path of German literary advancement. Luther was also a great hymn writer, and his collection of sacred songs is not the least of his priceless legacies.

On top of the Reformation came the Thirty Years' War, which quenched the springs of literature just as it sapped the life-blood from all things that were already thriving and promising still greater good to come.

From 1624-1748 has been called the

Age of Imitation. Real literary talent was scarce and men who had leanings towards letters unfortunately believed that the art of writing poetry could be taught. As in England during the years following the Restoration, the French classicists, Racine, Corneille and Molière, became the models for all youthful writers of inspiration. At the many courts the French manners and language were zealously cultivated, and the people at large lost sight of their native tales and ballads, and found a poor substitute in impure romances borrowed from Italy and France and the lewd camp-songs which foreign mercenaries had introduced. To such an extent had the German dialects become adulterated with the steady infiltration of foreign words, that a number of language-reforming societies sprang up everywhere on the lines of the 'Fruit-bearing League' founded in Weimar (1617). To this somewhat lifeless epoch belong the Silesian poets who are usually divided into two schools. Of the first the chief ornament was the precise and servile Martin Opitz (1597-1639), whilst Hoffmann von Hoffmannswaldau (1618-79) is typical of the second. It was the representatives of this latter school whose attempts to infuse sweetness and sentiment into their poems have brought down upon them the unflattering description of 'Turgid' and 'Bombastic.' Romances and windy tales of fiction and adventure steadily gained ground: many were the German versions of *Robinson Crusoe*, and the stormy years of the Great War were reflected in numerous *Tales of Ups and Downs*, by far the liveliest and most absorbing of which was the 'Simplicissimus' of Grimmelshausen (d. 1676). The healthy rivalry between the Leipzig and Zürich schools contributed much towards clearing away the pedantry and artifice which seemed likely to submerge any real stuff that was written. Thanks to the Swiss leaders, Bodmer and Breitinger, imagination and emotion reappeared in poetry, whilst Gottsched (1705-66), the foremost of the Leipzig men of letters, helped by his *Critical Art of Poetry* to wean men's tastes away from the French to which they had so long been blindly fettered. It remains to notice the two great writers of Protestant hymns after Luther, namely, Gerhardt (1607-76) and Gellert (1715-69); for it was through them chiefly that literature diffused itself among the common people. Gellert's *Fables* also, with their arresting simplicity and roguish humour, shared not a little in this work of popular education.

The second classical period opens in 1748, and the great movement towards literary regeneration, which may be said to culminate in Goethe and Schiller, was nobly heralded by and Klopstock (1724-1803), Lessing (1729-81), Herder (1744-1802), and Wieland (1733-1813). Klopstock's epic *Messias*, inspired as it was by *Paradise Lost*, is the fullest and finest expression of the unstinted admiration which Germans felt for the English masterpiece, and is further remarkable for the sublimity of many of its lines and for its tender and devout religious spirit which recalls the greatness of the old reformers. In his *Lacoon* and other critical works, Lessing taught men the difference between the pseudo-classicism of the French and the true Hellenic spirit as it is revealed to us in Greek sculpture and drama. He was moreover brave enough to declare the superiority of the romantic Shakespeare over the slavish followers of the so-called Aristotelian unities, and in his own plays strove to reproduce the merits of English rather than of French drama. The enthusiastic reception accorded to his comedy *Minna von Barnhelm* and his great tragedy *Nathan der Weise*, which may be said to have established the fitness of iambic blank verse as the vehicle for dramatic work, showed that like all true poets Lessing was only anticipating what was a popular tendency—a wider and a happier freedom in literature as in other fields of human endeavour. To pass away from Lessing, who is justly esteemed a pioneer in the rationalistic movement of his age, it is necessary to note the high niche which the sensuous and witty romances of Wieland will ever occupy in the history of German prose. But the command of this writer over all that is graceful and fantastic, his flowing verse, and the flexibility of his language are best appreciated in his celebrated fairy epic *Oberon* (1780). From an historical point of view the great merit of Herder was his deep love of all poetry that was truly national. Thus he gathered together the 'Volkslieder' of many nations, studied and wrote about primitive Hebrew poetry, and marvelled at the simplicity of the spurious *Ossian*. His was an essentially receptive nature, but he was born with a keen sense of the beautiful and a delight in humanity at large, and these personal qualities lend fascination to his poems. In that he was an apostle of 'Light, Love, (and) Life'—the three words which were graven on his tomb—he may be regarded as the source of inspiration for all that was noble in the 'Sturm und Drang' movement,

which now assailed literature, but in a broader sense this movement must be regarded as part of that unrest and desire of change which in France was manifested in the great Revolution, and which in England is represented in literature by the 'Lyrical Ballads' and other productions of the Romantic school.

The term 'Sturm und Drang' (Storm and Stress) was taken from a play of Klinger which bore this title. The intentions of the leading exponents Klinger (1752-1831) and Maler Muller (1749-1825) were undoubtedly good: they wished to fling away the shackles of art and to give free rein to all their enthusiasms and poetic ideals. Unfortunately, like the dramatists who followed Shakespeare, they were none of them gifted with outstanding literary talents, so that all their plays and novels are marred by extravagances of passion and hideous caricature, whilst their ideals of sublime action and character development, uncurbed as they were by any of the saving restrictions of art and moderation, resulted in pure licence. Moreover, in their efforts to substitute the cult of reason for morality they succeeded only in shattering the poetic gifts they had in lives of dissipation and excess. To realise the full force of this period of temporary madness, it is only necessary to recall the fact that Goethe's *Gotz von Berlichingen* and his *Sorrows of Young Werther*, in which literature may be said to have paid its highest tribute to sentimentalism, were both written under its influence.

Goethe (1749-1832) of course stands aloof from the normal channels of literary development together with the other Shakespeares and Dantes whom the world at intervals of centuries begets. His *Faust* belongs to universal literature. It has been called 'a mystical impersonation of a transition age,' where the ancient faith had died and science was still a weak prop on which to lean, where, in short, the individual was, whichever way he turned, dependent solely on his own good and evil instincts. Whether this be so or not, *Faust* is certainly the summary of its author's mental life, and may thus be said to mirror forth the struggles between the sensual and the spiritual, between faith and reason, between the noble and the base—struggles which are eternally raging in every human breast. But what is of peculiar interest touching Goethe from a psychological point of view and what perhaps may in some senses be regarded as typical of the modern spirit as well as of the German nationality is, that not only was he endowed with the

highest creative genius, but he had himself taken the utmost pains to acquire the most profound and all-embracing culture. His *Iphigenie* (1787), *Egmont*, and *Torquato Tasso* (1789) rank with *Wallenstein* (1799), *Maid of Orleans*, *Maria Stuart*, and *Wilhelm Tell* (1804), which are four of the finest dramatic productions of Schiller (1759-1805), his friend and almost rival. These two stand easily at the top of German dramatists and in the breadth of their outlook and of their historic sense; in their passion for all forms of freedom and the vividness and variety of their portraiture; and above all in their grasp of the essence of tragedy and dramatic situation challenge and almost deserve comparison with Shakespeare. Moreover both Goethe and Schiller outgrew the fevers of the 'Sturm und Drang' period and the former especially discovered the secret of that harmony which exists between the wonderful calm and self-restraint of the Hellenic spirit on the one hand and on the other the warmth, colour, and emotional fullness of the Romantic.

It is impossible to tie either Goethe or Schiller down to any one school or line of thought, and the same is true of the fertile Jean Paul Richter (1763-1825), who stands quite apart from the contemporary Romantic phase. In his lifetime his novels were even more welcomed and applauded than Schiller's or Goethe's works, and especially those classified as humorous, the first of which was *The Invisible Box*. All his books are remarkable for their fund of wit and wealth of exuberant fancies: tenderest sentiments are hedged around with the most pungent satire, whilst not a few may truly be described as 'a hodge-podge of the loveliest thoughts and the wildest absurdities.'

The aims of the Romantic school were not unlike those of Wordsworth and Coleridge and their successors in our country. Novalis (1772-1801), was a precursor of this school, but the 'theoretic basis of Romanticism' was established by the brothers Schlegel (August Wilhelm, 1767-1845, and Friedrich, 1772-1829). These men and their followers widened the province of poetry so as to include music and philosophy and all the other elements of intellectual life; they were opposed to the shallow utilitarianism and unlovely rationalistic theories of their age, and turned back for their inspiration into the mediæval days of knights and pageants; of miracles and mysticism. Mentally, too, they travelled farther afield into the unexplored riches of the E. and away back into the world of folk-lore and weird pagan super-

stitions. It was a time of admirable translations such as Schlegel's *Shakespeare* (1797-1810), and it was also a time when German philology and mediæval literature were first seriously studied, for both the Grimms (Jakob, 1785-1863, and Wilhelm, 1786-1859) came under the influence of Romanticism.

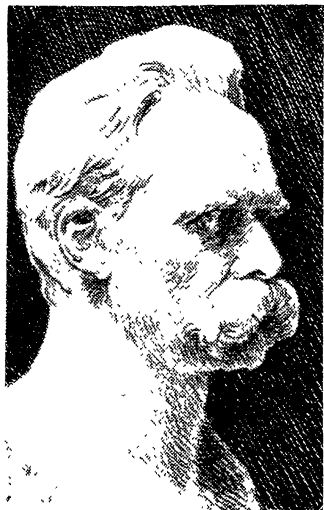
In time the Romantic school began to lose its hold, and after the famous July Revolution of 1830, 'Young Germany' occupies the literary field.



THE STATUE OF GOETHE AND
SCHILLER AT WEIMAR

Writers of this period no longer form a definite school, but they all reflect in their works the period of uncertainty and transition through which Europe was then passing. Furthermore, all manner of industrial, social, and economic problems begin to permeate literature, and it is customary also to associate together Young Germany and the predominance of the Hegelian philosophy. The leading men of letters at this time were Laube (1806-84), the author of social works of fiction; Börne (1786-1837), whose philo-French *Briefe aus Paris* are of vital importance in the progress of German prose; and Heinrich Heine (1797-1856). The last-named was the greatest of them all. Undoubtedly he was a victim of the transitional age into which he was born, and this explains how he could with justice be called 'the mocking-bird of the literary grove.' Yet in spite of his negative bias and unbefitting his poetry will live; for to him

was given in equal measure with Schiller and Goethe that purely in-born gift of lyrical outpouring. From this time forward literature gradually grew more and more comprehensive, so that now it includes all branches of knowledge and every field of human interest. It is difficult any longer to trace broad tendencies, for the whole trend of modern life in G., as elsewhere, has been towards a still greater complexity, and time only will suffice to unravel the main threads which now seem so entangled. But no sketch of German literature can be attempted without mention of the



F. NIETZSCHE

number and prominence of the philosophers. The first of mark was Leibnitz (1646-1716), who wrote in French and Latin; and eighty years later came Kant (1724-1803), the author of the *Critique of Pure Reason*; whilst other thinkers of world-wide repute are Fichte (1797-1879), Schopenhauer (1788-1860), and Hegel (1770-1831). The latest, and one of the most original, of the great philosophical writers is Nietzsche (1844-1900), whose doctrines of superman and the justice of self-assertion, etc., which are often summed up as individualism, have had, and are still having, a remarkable influence over the intellectual development, not only of his own countrymen, but of a great

number of growing men and women in all parts of the world. It is not too much to say that in the regions of higher philosophy G. stands quite without a compeer.

From 1850 to 1870 the novel engrossed most of the best writers. This form of literature became the favourite vehicle of expression all over Europe, probably because it is so elastic that the author may freely bend it to his will and embody in it the whole sphere of his culture and experience. Thus there were many social novels on the basis of Gutzkow's *Ritter vom Geiste*; there were political and antiquarian novels; there were stories which dealt with the peasants, such as Auerbach's *Schwarzwälder* (1843-54), and there were tales in the form of biography, such as Keller's splendid *Der grüne Heinrich* (1855). For some time authors devoted themselves to realistic fiction, but *Buddenbrooks* (1902) and the work of the women writers, Clara Viebig, Helene Böhlau, and Gabriele Reuter deal rather with problems of emotion and psychology which seem better suited to the Teutonic temperament.

In dramatic literature there were few outstanding writers until quite recent times. In the period immediately preceding the Great War, Hauptmann (q.v.) and Sudermann (q.v.) held the stage with their plays, which are real products of the time. The gloomily realistic *Weavers* (1892) is the best known of Hauptmann's works, though he has also produced quite notable romantic work, in such plays as *Die Versunkene Glocke* and *Hanneles Himmelfahrt*.

One other aspect of German literature remains to be touched, and that is the wealth of scientific writers. Whether the reader turn to philology, medicine, the natural sciences, archaeology, history, economics, jurisprudence, astronomy, mathematics, or theology, he will find that a number of the most reliable, erudite, and compendious treatises have been written by Germans. Thus Mommsen (1817-1903) has left behind him a monumental work on Roman history; Humboldt (1767-1835) by his *Travels* and *Cosmos*, etc., gave an extraordinary stimulus to scientific inquiry; Kepler (1571-1630) discovered certain laws of primal importance in astronomy; Euler (1707-83) ranks as one of the great mathematicians, and in the last century Virchow eminently distinguished himself in pathology, and Helmholtz in the newly-conquered dominion of physiological physics. All these men have written on their work.

A short list of other individual

writers of eminence is herewith appended that the reader may refer to their biographies for further information: Gottfried of Strasburg (d. 1220); Meister Eckhart (c. 1260-1327); Johann Tauler (c. 1300-61); Sebastian Brandt, the satirist (1458-1521); Jacob Ayer, sixteenth century dramatist; Ulrich von Hutten (1488-1523), and Huldreich Zwingli (1484-1531). Protestant writers contemporary with Luther; the Catholic Johann Scheffler (Angelus Silesius, 1624-77), Sebastian Franck (1499-1542), and Paul Gerhardt (1607-76), all famous hymn writers; Jakob Böhme (1575-1624), and Johann Arndt (1555-1621), two mystical religious writers; the monkish Abraham a Sancta Clara (1614-1709) and Johann Fischart (c. 1550-90), two leading satiric writers of succeeding centuries; two Silesian authors. Friedrich von Logau (1604-55), the epigrammatist, and Andreas Gryphius (1616-64); the dramatist Winkelmann (1717-68), the writer on aesthetics, and Johann Zimmermann (1728-95), author of *On Solitude*; Voss (1751-1826), the light of the *Göttinger Dichterbund*, and his associates Gottfried Bürger (1747-94), and the two Counts Stolberg; August Kotzebue (1761-1846), the author of lively comedies, and Johann Tieck (1773-1853), a leading Romanticist; Heinrich von Kleist (1777-1811), the first of Prussia's dramatic writers; Ludwig Uhland (1787-1862), the chief of the Swabian school; Karl Gutzkow (1811-78), a member of Young Germany; Wilhelm Hauff (1802-27), K. Spindler (1796-1855), and Wilhelm Häring (1789-1871), who wrote novels after the manner of Scott; Franz Grillparzer (1791-1872), the finest Austrian poet; E. Geibel (1815-84), the lyricist; the novelist Gottfried Keller (1819-90); Ferdinand Lassalle (1825-64) and Karl Marx, two of the best intellectual writers on social democracy; three historians of note, L. von Ranke (1795-1886), H. von Sybel (1817-95), and H. von Treitschke (1834-96); the Austrian Anzengruber (1839-89), who depicted on the stage the life of his native peasantry; the favourite humorist and fiction writer, Fritz Reuter (1810-74), who wrote in Plattdeutsch; and O. J. Bierbaum (1865-1910), the composer of popular lyrics.

Twentieth-Century German Literature.—Before the Great War German literature experienced comparative calm. Important writers of this period were the dramatists Gerhart Hauptmann (1862-1913), his contemporary Sudermann, and Frank Wedekind (1864-1918), whose influence over European literature is

still felt, the poets Dehmel, Rilke and Stefan George, the novelists Thomas Mann and Jakob Wassermann. The main influences of this period were Naturalism and its opposite 'art for art's sake,' Hauptmann leading the former school and Stefan George the latter. Interest was also shown by the poets in machinery and the subjection of physical resources to the use of civilised man. During the first half of the Great War in Germany, as in other countries, a great deal of patriotic unintellectual literature was produced, but after 1917 war weariness and despair, accentuated in Germany by the Revolution (1918), had its effect on the younger writers. Johannes Becher in his works violently opposed war, and the chaotic state of life was expressed generally in literature by Expressionism (*q.v.*), a movement borrowed from Painting in a spirit of almost ecstatic mysticism. Some writers such as Armin T. Wegner turned from the cities and roar of machines to find satisfaction and peace on the land and in the countryside. Labourer poets of the war were Karl Broger, Gerrit Engelke, Max Barthel and Heinrich Lersch. War novels have been written by Remarque and others, and the state of Germany at home during the Great War is shown in the novels of Clara Viebig; while one of the greatest war books is *Opfergang*, written by Fritz von Uruh in the trenches in 1916. Post-war Germany is mirrored in Ernst Toller's tragedy *Hinkermann* and Reinhard Goering in the drama *Seeschlacht* represents the attitude of the navy in the Great War. Expressionist drama, dealing with types and making use of allegory, was written by Walter Hasenclever, Fritz von Uruh, Franz Werfel, Arnolt Bronnen, Ernst Toller, Georg Kaiser and Anton Wildgen. Satirists of the twentieth century are the novelist Heinrich Mann and the dramatist Carl Sternheim. The Expressionist writers were as a rule socialists. Kurt Eisner (*q.v.*) the poet being assassinated, while another tendency revealed in their work was their changed attitude towards women, relationship between men and women being intellectual rather than emotional. In 1922 Expressionism subsided and painters and writers, tired of dealing with types and symbols, are seeking new forms. Some writers, such as Von Uruh, are making use of historical subjects, while others have shown a renewed interest in the Catholic religion. Another interesting tendency in contemporary G. L. is the marked manifestation of Jewish temperament, owing to the great

number of Jewish writers. Earlier pre-war writers who still continue to be important are the poets Stefan George and Rainer Maria Rilke and the novelist Thomas Mann.

German Art.—The development of Art in G. is similar to that in other European countries. (For greater detail see under PAINTING, etc.) During the Middle Ages the cathedrals such as the one at Cologne were built. The art of illuminating manuscripts was developed, followed by the art of enamelling and miniature painting. During the Renaissance G. had two great painters and etchers, Dürer and Holbein the Younger. In the nineteenth century many frescoes were painted, the most important being by Cornelius and by Wilhelm von Kaulbach. An important impressionist painter of this century is Hans von Marees.



J. S. BACH

Artists of the twentieth century who may be mentioned are Max Liebermann, Weisgerber, Franz Marc the Expressionist, Paul Klee, Schreyer, Cezar Klein, and the sculptor, Uphoff. Twentieth-century Ger. architecture is worthy of notice, and special attention has been given to the building of large dwelling-houses and blocks of flats.

Music.—Few would gainsay the assertion that G. is pre-eminent in music, though some would perhaps prefer that the word music was qualified by 'modern,' in recognition of the early supremacy of Italy in opera and in sacred music. It is, at least, certain that it is to G. alone that the world owes the 'magnificent development of instrumental music.' And the Germans can point not only to isolated composers of genius like the English Purcell, but to great musicians who are representative of

every school, and who excel in every branch of musical activity. In some way the decentralisation of the Ger. states and the multiplicity of Ger. courts must have been favourable to the cultivation of the art. It is true that the princes and dukes were often generous patrons, whilst all of them had their court musicians and held concerts from time to time, which offered a suitable occasion for the performance of new works. Music, moreover, was always associated with the religious life of the people. Thus, not only in the towns but even in the smaller villages there were chapel-masters ('Kapellmeister') whose business it was to train the choir and to conduct the orchestra, which played so great a part in the social life of the people. In every capital, too, like Dresden and Leipzig, there were opera houses which offered another field for the labours of a musician whether player or composer, and it should not be forgotten that public subsidies were again and again voted for the upkeep of these centres of musical culture.

Sebastian Bach, the 'father of modern music' (1685-1750), gave a splendid scientific foundation to his art, and by his improvement of the existing forms of composition made possible the glorious work of Haydn and Mozart. It was through these men, his successors (1733-1809 and 1756-91), that the world first learnt that in the modest unassuming Bach it had lost truly a master spirit, for they were never weary of confessing their indebtedness for all that he had taught, and especially for the lessons learnt from his immortal *Preludes and Fugues*. Under Haydn and Mozart the sonata and the symphony—probably the greatest vehicles for musical expression ever invented—grew apace, and posterity is still as delighted as ever with the freshness, the melodious wealth, the grace, and the old-world dignity of their many masterpieces. Yet Haydn and Mozart were but stepping-stones to Beethoven (1770-1827), who stands in solitary grandeur—solitary save for the companionship of such men as Raphael, Pheidias, and Shakespeare. For he found the secret of expressing in sound the profoundest thought and the loftiest spiritual yearnings of which mankind is capable. Whether his pianoforte sonatas, his opera *Fidelio*, or his oratorio *The Mount of Olives* be considered, the same prodigality of fine conceptions, the same beauty, and the same extraordinary power make themselves felt, whilst his inexpressibly glorious symphonies (nine in number) are still the example and at the same time the

despair of every orchestral composer of ambition.

Later Ger. composers are Schubert (1797-1869), the exquisite song-writer and the creator of the *Unfinished Symphony*; Schumann (1810-56), the leader of the Romantic school, who found relief for the unrest of his fiery spirit in his brilliant and imaginative pianoforte pieces; and Richard Wagner (1813-83). Before Wagner's time opera (and oratorio) had already engaged the attention of Mozart (*Le Nozze di Figaro*), Handel (1684-1759), and Gluck (1716-87), the author of *Orpheus* and *Eurydice* and *Iphigenia in Tauris*, Mendelssohn (1809-47), but the new composer came forward with a host of revolutionary ideas which were the foundation of the 'Music of the Future.' To Wagner the resources of his art were boundless. He believed that only by the marriage of music with the sister arts, painting and poetry, could all the cravings and all the greatness of the human soul find adequate expression. Thus, his operas were conceived on a Titanic scale; in them there is nothing of the trivial sentimentalities of the Italian school, and what is of more vital importance, the function of the orchestra is no longer merely to accompany the singer, but to suggest moods, phases, and conceptions which are inexpressible in words. Thus, in the vast cathedral-like structures which he built up in *Parsifal*, *Lohengrin*, and *Tannhäuser* the orchestra forms an integral part, without which the whole fabric would speedily collapse. In his lifetime Wagner was the victim of ceaseless, often senseless, ridicule, but even his most inveterate foes must now admit that the performances of *Die Walküre*, *Siegfried*, etc., were the dawn of a new and not less noble epoch in the annals not only of Ger. but of European music. There are a number of late nineteenth and twentieth century writers of opera who have imitated Wagner—Peter Cornelius, Carl Gramann, Eugène D'Albert, Alexander Ritter, August Bungert, Wilhelm Kienzl, Felix Weingartner, Siegfried Wagner, and Engelbert Humperdinck. These men are imitators, but an exception is Carl Goldmark (b. 1830). G. in the twentieth century takes the lead in instrumental music. Johann Raff (1822-82) forged the link between the classic school and that of Liszt. Felix Daescke, a virile composer, Max Bruch, Joseph Rheinberger, Heinrich Hoffmann, Johann Huber, Frédéric Gernsheim, Heinrich Herzogberg, Moskowski, Xaver Scharwenka, and Sholtz are all late nineteenth-century composers of the

newer instrumental music, while three composers, Carl Renicke, Solomon Jadassohn, and Frederick Hiel are followers of the classic tradition. Johannes Brahms (1833-97) startled the world by outstripping even Wagner with his indifference to old forms and canons, but his title to the highest musical honours is assured, while other composers who have written advanced instrumental music are Anton Bruckner (1824-96) and Richard Strauss (b. 1864). Strauss is the composer of the operas *Salome*, *Electra*, *Rosenkavalier*, and followers of Strauss who may be named are Gustav Mämler, Felix Weingartner, and Hugo Wolf, who is a lyric artist of importance. Schöenberg, a skilled technician, has achieved European repute with his exploitation of new forms. G. also possesses many important musicians, singers, and directors, and the writings of Kiesewetter and others have advanced the history and æsthetics of music.

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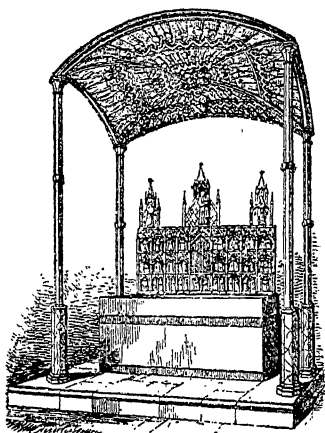
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Germination, the resumption of development of the seedling from the

embryo contained in the seed. In consequence of exposure to the necessary conditions of moisture, warmth, etc. The radicle, or young root, is the first to make its appearance, and begins to grow vertically downwards; the plumule, or young shoot, then begins to grow upwards, while the cotyledons take an approximately horizontal position.

Germiston, a tn. in the Transvaal, 9 m. from Johannesburg. It lies in the heart of a gold-mining district, and is an important railway junction. A quantity of land has been taken up since 1917 for industrial sites. Pop. including coloured, about 50,000.



THE HIGH ALTAR OF GERONA CATHEDRAL

Gérôme, Jean Léon (1824-1904), a French painter, b. at Vesoul. In 1841 he became a pupil of Paul Delaroche. In 1847 his 'Cock-fighting' was exhibited. In 1855 'Le Siècle d'Auguste et la naissance de Jésus-Christ,' placed him among the leading French painters. The state purchased it, and bestowed upon G. the Cross of the Legion of Honour. The 'Duel' of 1857 increased his reputation, and the 'Gladiators' (1859) was looked upon as his masterpiece. Among his Oriental studies are 'Turkish Prisoner,' 'Prayer,' and 'Slave Market.' He excelled also in historical subjects, 'Louis XIV. and Molière' and 'The Death of Marshal Ney' are famous examples in this class.

Gerona: (1) a prov. in the N.E. of Spain, bounded on the N. by France,

on the E. by the Mediterranean Sea, on the W. by Barcelona, and on the S. by the Mediterranean and Barcelona. It is important for its fisheries and fish-curing, as well as for its cork industry. There are also mineral springs in the province, and its mines produce coal, copper, lead, and iron. It also manufactures linen, cotton, paper, cloth, and leather, and has hydraulic cement and ochre works. Its most important port is Portbou, and its area is 2264 sq. m. Pop. 326,000. (2) A fortified tn. in Spain, cap. of the above prov., about 53 m. N.E. of Barcelona. It is famous for its fifteenth-century cathedral and its siege at the hands of the French in 1809. It is also the seat of a bishop. Pop. 17,600.

Gerry, Elbridge (1744-1814), an American statesman, *b.* in Massachusetts. He took his degree at Harvard in 1762. From 1774-5 he was a member of the Massachusetts Provincial Congress; a member of the Continental Congress (1776-81), and was a great advocate of the Declaration of Independence. From 1810-2 he was governor of Massachusetts. His administration is marked by the enactment of a law by which the state was divided into new senatorial districts, which gave an unfair advantage to the party in power. From this has arisen the term 'Gerry-mander.' In 1812 he was elected vice-president of the United States, and was an ardent advocate of war with Great Britain.

Gers, a dept. in the S.W. of France, formed from various districts of Gascony. Its principal rivers are the Save, the Gimone, the Gers, and the Bayse, and chains of hills run from N. to S. of the department. The principal cereals are wheat and oats, but the vine occupies more than 15 per cent. of the surface, the average production being more than half that of France generally. Pop. 195,569.

Gershwin, George, Jewish-American composer; *b.* Sept. 26, 1898, at Brooklyn, N.Y.; son of Morris G. He studied the piano under Chas. Hambitzer; harmony under Edwd. Kilenyi and Rubin Goldmark. Composes musical comedy and orchestral work:—*La, la, Lucille!* 1919; *Our Nell*, 1923; *Lady, be Good!* 1924; *Tell Me More*, 1925; etc.

Gerson, Jean Charlier de (1363-1429), a French scholar and divine, *b.* at the village of Gerson, in the department of Ardennes. He studied at the College of Navarre, Paris. In 1395 he was elected chancellor of the university of Paris and made a canon of Notre Dame. His chief work was his endeavour to abolish the papal schism at the councils of Pisa and

Constance, also fighting hard against the evils in the church. At least implicitly he held the Council to be above the Pope. After the Council of Constance G. had to leave France owing to the enmity of the Duke of Burgundy, and spent some time at Rattenberg in Tyrol. Here he wrote his famous book, *De Consolatione Theologiae*. On his return to France he retired into a monastery at Lyons, and devoted the rest of his life to teaching and study. The *Imitation of Christ* has been wrongly attributed to him. Much has been written about G., for further information see *Essai sur Jean Gerson, chancelier de l'Université de Paris*, by Charles Schmidt, or *Johannes Gerson*, by Schwab.

Gersonides, or **Levi ben Gershon** (1288-1344), Fr.-Jewish philosopher, mathematician, and physician: *b.* at Bagnols-sur-Cèze in the county of Orange. Sometimes called Raibag—that being a vocalisation of the initials of Rabenu Levi ben Gershon. He came of a family of scholars, but the identity of his father is in dispute. His principal work is *Milhamot Adonai* (Wars of the Lord): a treatise on immortality, prophecy, omniscience, providence, the celestial spheres, and the eternity of matter. He followed Aristotle: being the first Jew that dared, in so doing, to join issue with Hebrew theology. He *d.* at Perpignan, April 20.

Gersoppa, Falls of, on the Sharavati R., in Bombay, are considered the finest in India. The river divides in its descent into four cascades, and the cliff over which it falls is 830 ft. high.

Gerstenberg, Heinrich Wilhelm von (1737-1823), a German poet and critic, *b.* at Tondern, Schleswig. He studied at Altona and Jena, entered the Danish army, and served in the Russian campaign of 1762. He left the army for the civil service, but resigned his appointment in 1812. He did good service to German literature by his *Briefe über Merkwürdigkeiten der Literatur* (1766-70), as well as by his tragedy, *Ugolino* (1768), which was one of the principal forerunners of the classical period of modern German literature.

Gertrude, Saint (c. 1256-1303), a German mystical writer who lived in the convent at Helfta, near Eisleben. She is sometimes confused with the abbess of the same name, but Ledos' book, *Sainte Gertrude*, 1901, throws light upon this subject. A book entitled *Exercises of St. Gertrude* is famous in mystic theology, it was translated into English in 1863. She anticipated the 'modern' Roman

Catholic devotion to the Sacred Heart of Jesus.

Gervase of Canterbury, an English monk who flourished during the second half of the twelfth century. He was an eye-witness of the burning of Canterbury Cathedral and wrote *Tractatus de combustione et reparatione Duoburnensis ecclesie*, 1184. All his books are written in Latin, the chief of which are: *Narrative of the Dissensions between Archbishop Baldwin and the Monks of Canterbury*; *a History of the Archbishops of Canterbury, to the accession of Hubert in 1193* and *a Chronicle of the Reigns of Stephen, Henry II., and Richard Cœur-de-Lion*. His *Mapa Mundi*, a topographical account of England survives in manuscript.

Gervase of Tilbury (d. c. 1235), an English historical writer, said to have been a native of Tilbury. Before 1177 he was a student of law at Bologna, and witnessed the meeting of the Emperor Frederic I. and Pope Alexander III. at Venice. He was first employed by Henry II., for whom he wrote a jest-book, and later entered the service of William of Champagne, Cardinal Archbishop of Rheims. About 1190 he was with William II. of Sicily, who gave him a country house at Nola, and in 1198 entered the service of the Emperor Otho IV., who made him marshal of the kingdom of Arles, and married him to an heiress. It was to amuse the emperor that he wrote his best-known book, *Otia Imperialia*, which contains a historical geography of the world as well as a good deal of legendary matter. The *Otia Imperialia* is printed entire in Leibnitz's *Scriptores Rerum Brunsvicensium*.

Gervex, Henri (b. 1852), a French painter, b. in Paris. He first devoted himself to the painting of mythological subjects and the painting of the nude, but afterwards took up the study of modern life with great success. He has executed several important official paintings, for instance 'The Distribution of Awards,' 1889, at the Palais de l'Industrie, and the 'Coronation of Nicolas II.,' 1896, besides paintings for the decoration of public buildings. Other pictures of his are: 'Satyrs playing with a Bacchante,' 'Members of the Jury of the Salon,' 'Communion at Trinity Church,' 'Return from the Ball,' 'Dr. Péan at the Salpêtrière.'

Gervinus, Georg Gottfried (1805-71), a German historian, b. at Darmstadt, and brought up for the mercantile profession, but he soon abandoned this for the study of history. In 1835 he was appointed professor-extraordinary at Heidelberg, and in 1836 professor of history

and literature at Göttingen, from which he was dismissed in 1837 for signing the protest against the conduct of King Ernest Augustus. He went to Heidelberg, and in 1847 started the *Deutsche Zeitung*. In 1848 he was chosen a member of the Frankfurt national assembly, and in 1850 was sent to London on a diplomatic mission in which he was unsuccessful. G. was a true patriot and a defender of constitutional liberty which is shown by his writings as well as by his conduct; his *Introduction to the History of the 19th Century* and his *History of the 19th Century* led to his imprisonment. His other most important works are his *History of German Poetry*, and his *Shakespeare*

Geryon (from γηρῶν, the howler or roarer), is represented in Greek mythology as a monster with three heads. He was the son of Chrysaor and Callirrhoe, and king of the island of Erytheia. He had herds of red cattle which were guarded by the giant shepherd, Eurytion, and the two-headed dog, Orthrus. One of the twelve labours imposed upon Heracles by Eurystheus was the capture of these cattle.

Gesenius, Friedrich Heinrich Wilhelm (1786-1842), the great reviver of Hebrew philology, b. at Nordhausen. He studied at the universities of Helmstadt and Göttingen. In 1811 he was elected professor of theology at Halle, a post he held to the day of his death. G. set himself to revive the study of Hebrew, bringing forward a new and improved method of treating the language by separating the grammar and the lexicon. In 1810-12 he published *Hebräisch-deutsches Handwörterbuch des Alten Testament*; in 1815 appeared *Neues Hebräisch-deutsches Handwörterbuch*; both these lexicons have been translated into English.

Gesner, Johann Matthias (1691-1761), a German classical scholar, b. at Roth near Nuremberg, and studied at Jena. In 1715 he became professor and librarian at Weimar; in 1728 he was made headmaster of the gymnasium at Anspach. In 1730 he was appointed head of the Thomas School at Leipzig, and in 1734 became professor and librarian at Göttingen. His works include: *Philopatris*, 1714, ascribed to Lucian; editions of the *Scriptores rei rusticæ* of Claudian, Horace, Quintilian, and Pliny the Younger; *Præe linæ isagoges in eruditionem universalem*, 1756; *Novus linguae et eruditionis Romanæ thesaurus*, 1749; *Opuscula minora varii argumenti*, 1743-45; *Thesaurus epistolicus Gesnerianus*; *Index etymologicus latinitatis*, 1749.

Gesner, Konrad von (1516-65), a Swiss writer and naturalist, *b.* at Zürich. Hallam says: 'Endowed with unwearied diligence, and with a mind capable of omnifarious erudition, Gesner was probably the most comprehensive scholar of his age.' He studied at Strassburg, Bourges, and Paris, and was appointed professor of Greek at Lausanne in 1537. In 1541 he became professor of natural history at Zürich. G.'s favourite study was probably botany, and he published in 1542 a *Catalogue of Plants* in four languages: Latin, Greek, German, and French. He enriched his botanical knowledge by frequent journeys, and founded a small botanical garden at Zürich. Another important work of his is *Bibliotheca Universalis*. This is a catalogue of all the writers who had ever lived, with their works, and is written in Hebrew, Latin, and Greek. In 1551-58 appeared his great zoological work *Historia animalium*. Besides these he wrote *Mithridates de differentiis linguis*, an account of about 130 languages, and the Lord's Prayer in twenty-two tongues.

Gessner, Salomon (1730-88), a Swiss painter and poet, *b.* at Zürich. He spent some time in Berlin and Hamburg, but most of his life was passed in his own town, where he carried on a bookseller's business. He first became famous by his *Lied eines Schweizers* in 1751. Other writings of his are: *Daphnis, Idyllen, Inkel und Farike*, and *Der Tod Abels*. His works are sentimental, insipid, and feeble, but they achieved universal popularity at the time of their publication, owing to the appreciation of Goethe, Lessing, and Herder. His paintings are mostly in water-colours, but he also executed some very fine engravings. His *Letters on Landscape Painting* were published in 1772. He practised art as an amateur till he was thirty, studying nature as well as the works of Claude and Poussin. From these he formed his style. His paintings are delicate, but like his writings border on feebleness.

Gesta Romanorum ('Deeds of the Romans'), the name given to a collection of Latin stories which was compiled probably at the end of the thirteenth century, or at the beginning of the fourteenth. Its authorship is unknown, and its title is only partly appropriate, for at the present time it contains fragments of Oriental and European origin as well as those from Latin and Gk. history. The style of the book is bad, but it is interesting from a literary point of view, for it contains the sources of the writings of Gower, Chaucer, Shakespeare, and others, *e.g.* Chau-

cer's *Man of Lawes Tale* and the main outlines of Shakespeare's *King Lear*. The first printed edition of the modern form of G. R. was issued at Utrecht about 1473, and an edition in English was printed by Wynkyn de Worde, 1510-15. There is a good modern translation by Rev. Swan in Bohn's Library.

Gestation, the retention of the young in the uterus from the time of the fertilisation of the ovum—that is, conception—to the moment of delivery. The period of G. varies with the number of the offspring and the degree of their development at birth; with the size of the mammal and, above all, with its status in the scale of evolution. The longer duration of the condition of pregnancy is an important factor in the growth and evolution of the higher species. As regards animals which have litters, the normal length of G. for a rat is 28 days; for a rabbit 35, and for a bitch 62 days. The G. of a sheep, cow, and mare usually lasts five, nine, and eleven months respectively. For a giraffe, the period may be 430 days, and for an elephant more than 600 days. For women the period varies considerably above and below nine months.

Gesualdo, Carlo, Prince of Venosa (*c.* 1560-1613), Italian musician, *b.* in Naples; second son of Fabrizio, second Prince. Carlo was renowned as a performer on the bass-lute. His elder brother Luigi *d.* about 1585. Carlo married his first cousin Maria d'Avalos; who, though only twenty-one, had already been married twice and had children. Carlo and she had one son. She became paramour of Fabrizio Carafia, third Duke of Andria; Carlo killed them on the night of Oct. 16, 1590, and caused her lately-born child to be shaken to death. He fled to the Castle of Gesualdo. He succeeded his father as Prince, 1591. In 1594 he married Eleanora d'Este, at the court of whose family, at Ferrara, he afterwards resided, occupying himself with melancholy music—being, as a composer, a law unto himself. He is supposed to have returned to Gesualdo (where, in remorse, he founded the Convento dei Cappuccini), and to have *d.* there.

Getæ, a tribe of Thracian extraction, mentioned in history in the time of Alexander the Great as dwelling on the banks of the Danube. In the middle of the fourth century they settled in Transylvania and were conquered in 515 B.C. by Darius, King of Persia. Both Alexander the Great and Lysimachos made attempts to subdue them, but without success.

They became politically united with the Dacians in the early part of the first century B.C., and during the greater part of the first century A.D. continued to harass the Rom. legions. In A.D. 106 they were conquered by Trajan and their country incorporated in the Rom. empire.

Gethsemane (Aramaic, from *gath*, a wine press; *shemen*, oil), a small place, about three-quarters of a mile from Jerusalem, on the Mount of Olives. It contained a garden, the favourite resort of Christ and His disciples, and was the scene of the agony on the night before the Passion. The site is identified with a square enclosure and is supposed to be near the real location, though recent explorers consider it to be too near Jerusalem to be G. itself.

Gettysburg, in U.S.A., a bor. and the co. seat of Adam's co., Pennsylvania, situated on the Western Maryland and the Philadelphia and Reading railroads, and 35 m. S.W. of Harrisburg. It is an agricultural region, built on and surrounded by picturesque hills, and contains several mineral springs of medicinal value. It is the seat of a Lutheran theological seminary and of Pennsylvania College, founded in 1826 and 1832 respectively. The industrial establishments comprise granite-yards and various manufactures. G. was founded in 1770 and incorporated as a borough in 1806. The battle named after it, and one of the most important of the Civil War, was fought here in 1863, and a battle monument, surmounted by a statue of Liberty, now rises from the brow of the hill. Abraham Lincoln's celebrated Dedication address was made here on Nov. 19, 1863. Pop. 5584.

Geulinx, or Geulingx, Arnold (1624-69), a Dutch philosopher and one of the disciples of Descartes, *b.* at Antwerp. Little of an authentic nature is known about his life. He commenced to lecture at Louvain University in 1646 and continued to do so for twelve years, but at the end of that period was deposed and compelled to leave the city. In 1665 he was appointed professor of philosophy at Leyden, but *d.* four years later. G. is a leading exponent of the speculative doctrine known as 'Occasionalism,' and the salient point of his teaching is an endeavour to explain the relations existing between body and soul. His chief works are: *Saturnalia, Logica, Ethica, and Metaphysica Vera.* (See J. P. N. Land's *A. Geulinx und seine Philosophie*, 1895; Grimm's *Arnold Geulinx Erkenntniss-theorie und Occasionalismus*; and studies by Pfeiderer (1882), and Samtleben (1885).)

Gevelsberg, a tn. in Germany, in the prov. of Westphalia, 28 m. from Düsseldorf. It has iron and steel works, and manufactures steel wares, gas stoves, and machinery. Pop. 20,369.

Gex. A tn. of France in the dept. of Ain, it lies on the Jura Mts., 11 m. N.W. of Geneva. It has a station on the P. L. M. Rly. There are tanneries in the town, and cheese is made. Pop. 2878. Gex was formerly a district of anct. Burgundy and, in the sixteenth century, Geneva and Berne disputed its possession with the Duke of Savoy. Henry IV acquired it by treaty in 1601. In 1815 six cantons were separated from it and given to Geneva, the rest becoming part of the dept. of Ain.

Geysers (Icelandic *geysa*, to burst out violently), mountains of hot water and steam of an eruptive nature met with in various quarters of the globe, more especially in Iceland and New Zealand. A G. consists of two parts, a basin and a tube. Deposits of silica, formed as the water evaporates, and sometimes becoming like a crater, form the basin of the G., whilst the tube leads beneath the surface, and in it water accumulates and is gradually heated until steam overcomes the pressure of the water, and a column of hot water is projected into the air through the tube. The G. in Iceland are the best known in the world. They are situated within sight of Mt. Hekla, and are the hottest springs in Europe. The Gs. of New Zealand are celebrated principally on account of the beautiful terraces associated with them. The basins connected with these G. are much used by bathers and resorted to by invalids. The Yellowstone region in N. America also abounds in G., said to be very wonderful and picturesque. The three localities mentioned are where G. attain their highest development; but they also exist in many volcanic regions, such as Japan, S. America, and the Malay Archipelago.

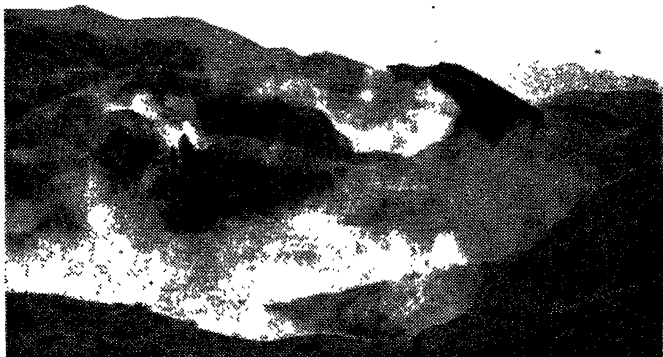
Gezer, a city in Palestine, referred to in the Bible as the city of Dan. It is situated in the low hills W. of the Jerusalem mountains. In ancient geography it is a Canaanite city within the territory of Ephraim. Its site is the modern Tel Jezar. About 1500 B.C. it is noticed as a tributary to Egypt. Since 1902 the Palestine Exploration Fund has been employed in excavating, and has made some interesting discoveries.

Gfrörer, August Friedrich (1803-61), a Ger. historian, *b.* at Calw in the Black Forest. He studied theology at Tübingen, and afterwards went

to Lausanne, Geneva, and Rome. In 1830 he became librarian in the public library of Stuttgart, and devoted himself almost entirely to historical studies. In 1831 he produced *Philo und die Jüdische Alexandrinische Theosophie*, followed in 1835 by *Gustav Adolf*, chiefly written with the object of bringing into prominence the political rôle of the Swedish king, rather than the religious one. In 1847 he was called to the chair of history in Freiburg, and in the following year was sent to the Frankfort parliament. His other most important works are: *Geschichte der Knolinger*, 1848; *Allgemeine Kirchengeschichte*; and *Papst Gre-*

Western G. appear as low hills, forming the edge of the plateau. The Eastern G. begin in the neighbourhood of Belasor and run through Madras. They are of a more broken character, with an average height of 1500 ft. Both ranges abound in health resorts.

Ghazali, Abu Mohammed Al (1058-1111), a Moslem theologian and philosopher, known in the West as Algazel, b. at Tus in Khorassan. He studied both at Tus and Nishapur, and was appointed to a chair of philosophy in the university of Bagdad at the early age of thirty-three. He held this position for only four years, after which he spent some



[Courtesy of High Commissioner for New Zealand

FRYING PAN HOT GEYSER, ROTORUA NORTH ISLAND, NEW ZEALAND

gorius VII. All his works display great learning, but his conclusions are ingenious rather than sound. He died at Carlsbad.

Ghadames, see GADAMES.

Ghardaia, see GARDALIA.

Ghat, a tn. and sandy oasis in the Sahara desert of Africa, which has belonged to Turkey since the year 1874. Pop. about 4000.

Ghats, or **Ghauts** (San. 'gates, passes or landing-stairs'), two converging ranges of mountains, known as the Eastern and Western G., running parallel with the E. and W. coasts of Southern India. The western range starts from the Tapti valley and forms an almost unbroken and precipitous barrier of rocks; the principal passes being the Thalghat and the Bhorghat. On the landward side there is a gradual slope to the table-land of the Deccan, and the

time in travelling and teaching at Damascus, Jerusalem, and Alexandria. G. struck a serious blow at the philosophy of the Arabians, for he represented the critical, if not sceptical, side of Arabian philosophy, casting doubt on the metaphysical teachings of the exponents of Aristotelianism. After his travels he returned to his native city, where he founded a Sufic College, to which he dedicated the remainder of his life in a religious and philosophic meditation. He published numerous works, the most notable of which are the *Opinions of the Philosophers*, and *Tendencies of the Philosophers*, introductions to his principal work, *Destruction of the Philosophers*. He also wrote several ethical treatises and many other works on religion and philosophy.

Ghaziabad, a tn. in the United

Provinces of British India in the Meerut dist., situated 15 m. E.N.E. of Delhi. There are barracks and a trade in leather, skins, grain, etc. It has become an important railway junction. Pop. 12,000.

Ghazipur, a city of British India in the United Provinces. It is the capital of the G. district and is situated on the l. b. of the Ganges, 44 m. N.E. of Benares. It is the headquarters of the gov. opium department, and the opium is manufactured here. The city extends along the Ganges for about 2 m., and the ruins of the Palace of the Forty Pillars are to be seen here. There is also a marble statue erected to the memory of Lord Cornwallis. A trade in sugar, rose-water, tobacco, coarse longcloth, etc., is carried on. Pop. 25,000.

Ghaznevids, or **Ghaznevides**, a famous Mohammedan dynasty of twenty-one rulers, founded by the freedman, Alpteghin (Alp-Tigin) of Bokhara, at Ghazni Afghanistan, about A.D. 962. He withstood the Samani dynasty, and his successors Sebukteghin (Sabuk-Tigin), 977-97, and Mahmud, 999-1030 (the most celebrated of the line), extended their sway over Kabul, Peshawar, and Lahore to N. and E.; to Bagdad and the Caspian on W. and N.W. The poet, Firdausi, and the philosopher, Avicenna, flourished at Mahmud's court. Later rulers were Masud I. (1030-41), Maudud (1042-48), Farrukh-zad (1053-59), Ibrahim (1059-99), Bahram (1117-50), Khusru Malik (1160-86, last of the dynasty). The capital was moved by the last three kings from Ghazni to Lahore in India. The power of the G. was shattered by the rulers of Ghur (about 1152), and finally overthrown by Shihab ud-Din Mohammed, Prince of Ghur (1186). Ghanzi was destroyed by the Mongols under Jenghiz Khan in 1224. It was the site of British struggles for possession in Afghanistan in 1839 and 1842.

Ghazni, **Ghuznee**, **Ghizni**, or **Gazna**, a tn. and port of S.E. Afghanistan, on R. Ghazni, 80 m. S.W. of Kabul. Near by are ruins of the ancient city, important in the Middle Ages and one of the finest cities in Asia under Mahmud (eleventh century). G. is surrounded by a mud wall, and is commercially important as being on the caravan route from Persia to India. It stands about 8000 ft. above sea-level. The British stormed the town in 1839, and re-captured it from the Afghans in 1842. There are two famous towers, and the site of Mahmud's tomb. The celebrated 'gates of Samnath,' kept here from about A.D. 1000, were removed to

Agra by the British in 1842. Moslem pilgrims frequently visit its numerous shrines. Trade in fruit, skins, and wool is carried on. Pop. about 10,000.

Gheel, a com. of Belgium in the prov. of, and 25 m. S.E. of the city of, Antwerp. It is known as a colony for the insane, as feeble-minded people have from earliest times been sent here to be under the control of, and employed by, the citizens. There is an infirmary for the temporary accommodation of those in need of medical assistance.

Ghent, a city of Belgium, the cap. of the prov. of E. Flanders. It is 31 m. N. W. of Brussels, and is one of the most important cities in Belgium. It is traversed by numerous canals, spanned by over 300 bridges. The general character of the city is that of a town of the Middle Ages, the older portion, with its narrow streets and gabled buildings, bearing a distinctly Flemish aspect. It is about 8 miles in circumference, and contains extensive gardens and promenades. The best view of the city is to be had from the Belfry, which occupies a central position and is 375 ft. high. The chief ecclesiastical building is the Cathedral of Saint Bavon, one of the most splendid edifices of the kind in Belgium, with its unpretentious Gothic exterior and magnificent interior covered with marble. It is also famous for its art treasures and contains the celebrated 'Adoration of the Lamb,' painted by the brothers Van Eyck. Other noted churches are those of St. Nicholas and St. Michael, the latter containing Van Dyck's 'Crucifixion.' Great architectural beauty and historic interest also mark the secular buildings of G.; notably the Town Hall, the Palais de Justice, and the Institut des Sciences, completed in 1890, and one of the largest public buildings of the city. It contains lecture-rooms, laboratories, and a university, founded in 1816. The squares of the town are noteworthy; in particular the Marché du Vendredi, the scene of some of the most important events in the history of the city. G. has also a number of old guild houses, about twenty monasteries, and the nunnery of the Grand Béguinage, founded in the thirteenth century. As regards its manufactures, these have greatly decreased in importance since the fifteenth century, prior to which G. occupied an important industrial position. Its spinning, weaving, and cotton-printing industry, however, is still considerable, and its manufactures lace, leather, sugar, and machinery. Its chief products are flowers, exported all over Europe.

Its commerce is still of considerable magnitude, and its harbour and shipping facilities are excellent. It has direct communication with the sea by means of a ship canal, which connects the Grand Basin with the harbour at Terneuzen and the Scheldt. A new lock at Terneuzen gives passage to vessels up to 26 ft. draught at any tide between that port and G. G. is the seat of a court of appeal, a commercial court, and a number of consular representatives. In historical respects, G. is a famous place, and is mentioned in history as early as the seventh century. It waged violent wars against Flanders and Burgundy, fought against Charles the Bold, and was several times taken by the Fr. It was incorporated into the kingdom of the Netherlands by the peace of Paris in 1814, and on the establishment of the kingdom of Belgium in 1830 became a Belgian possession. During the Great War G. was occupied by the Gers. from Oct. 1914 until the Armistice. The western part of the town suffered slight damage. Pop. 167,000.

Gherardesca, Ugolino, see UGOLINO DELLA GHERARDESCA.

Ghetto, a name of the Jews' quarter in Italian cities, and later in others. Originally Jews were strictly confined to this part and quite separated from their Gentile neighbours. The G. of Rome, instituted by Pope Paul IV., 1556, was only removed in 1885 on the making of the new Tiber embankment. There were 'Jewries' in England, in London, Lincoln, Oxford, and York. The derivation of the word is very uncertain (*borghetto*, little borough?). The system became obsolete about 1870, but the name is still used to mean Jews' quarters. See Heine, *Rabbi von Bacharach*; Philipson, *Old European Jewries*, 1894; Abrahams, *Jewish Life in the Middle Ages*, 1896; *Jewish Encyclopædia*; works of Franzos and Zangwill.

Ghibelline, see GUELPHS AND Ghibellines.

Ghiberti, Lorenzo (1378-1455), an Italian goldsmith, painter, and sculptor. He studied design under Bartoluccio, and in 1400 executed a fine fresco at Rimini in the palazzo of Pandolfo Malatesta. His design for the bronze gates to the Baptistery of St. John at Florence was preferred to those of his competitors, Brunelleschi being one of them. Scenes from the O.T. were represented, and later G. did another still finer gate. Michelangelo gave them the highest praise. The first gate was completed in 1424, the second, 1452. Other masterpieces are statues of St. Matthew, St. John the Baptist, and

St. Stephen for the church of Orsanmichele (1414-22); bas-reliefs for the Catherine of Siena, and Sarcophagus of St. Zenobius in Santa Maria del Fiore, Florence; sepulchral monuments of Dati and of the Albizzi at Florence (c. 1427). The bas-reliefs of the shrine of San Zenobi are especially fine. G. did much to restore the antique style in sculpture. In beautiful ornamentation and perfection of form and finish in all details he has never been surpassed. His earliest known work, a bronze-relief of the 'Sacrifice of Isaac,' is in the Uffizi. G. was chosen as colleague of Brunelleschi in the erection of the Florentine Duomo. See Hagen, *Chronik seiner Vaterstadt von L. Ghiberti*, 1833; Ciognara, *Storia della Scultura*; Scott, *Ghiberti and Donatello*, 1882; Perkins, *Ghiberti et son Ecole*, 1885; Gonelli, *Elogio di L. Ghiberti*, 1822; Schmarsow, *Ghibertis Kompositionsgesetze*; Vasari *Lives of the Painters and Sculptors*.

Ghika, Helena, Princess Koltzoff Massalsky (1829-88), a Rumanian writer, better known by her pen-name 'Dora d'Istria.' A daughter of Prince Michael, she married a Russian prince, 1849, and travelled widely in Europe. After 1855 she lived mostly at Florence. She studied classics under Pappadopoulos, and was a distinguished landscape painter. Her works include: *La Vie Monastique dans l'Eglise Orientale*, 1855; *La Suisse Allemande*, 1856; *Les Femmes en Orient*, 1859; *Des Femmes, par une Femme*, 1864; *Les Héros de la Roumanie*; *I Rumeni ed il Papato*; *Ghi Albanesi in Rumenia*; *Storia dei Principi Ghika* . . ., 1873; *La Poésie des Ottomans*. See Cecchetti, *Dora d'Istria*, 1871.

Ghika, Jon (1817-97), a Rumanian statesman, studied at Paris, becoming professor of mathematics and political economy at Jassy, 1843-45. A leader of the revolution of 1848 in Wallachia, he was representative of the provisional gov. at Constantinople. In 1854 the Sultan made him governor of Samos, and prince, 1856. Next year he returned to Wallachia. G. was prime minister under Prince Charles, 1866-67, and 1870-71. He helped to establish the hereditary principality of Rumania, 1866. He was Rumanian minister in London, 1881-90. His works include: *Convorbiri Economice*, 1866-73; *Letters to Vasili Alecsandri*, 1887; *Memories of Exile*, 1890, and translations of several plays of Shakespeare.

Ghilzais, a warlike clan of Pathan stock in E. Afghanistan, between Kabul and Kandahar. By language they are Aryan, and Holdich (1899) believes them to be of Turkish origin.

A race of sturdy farmers and shepherds, they were a severe menace to the British troops during the retreat from Kabul, 1842. They profess Mohammedanism, but some of their customs tend to reveal the existence among them of a primitive Christianity.

Ghirlandajo (or **Ghirlandaio**), **Domenico** (c. 1449-94) (properly Domenico Bogordi, or Corradi), surnamed 'il Ghirlandajo or Grillandajo' (garland-maker), after his father Tommaso Bigordi, a goldsmith. He was a celebrated painter and mosaicist; founder of a famous school of painting, and the first Florentine to attain



DOMENICO GHIRLANDAJO

skill in aerial perspective. He studied under Baldovinetti, and was influenced by Castagno, Masaccio, and Verrocchio. Among his pupils were his two brothers Davide and Benedetto, Michael Angelo, Francesco Granacci, and Bastiano Mainardi. Domenico painted numerous scenes from the lives of the Virgin and John the Baptist. He executed frescoes in Florence in the church and refectory of Ognissanti (1480), only 'The Last Supper' and 'St. Jerome' being left; in the Sassetti chapel in Santa Trinità (1485); 'Life of Saint Fina' in the Capella Fina (1475); in the choir of Santa Maria Novella ('St. Francis,' 1485-90); in the chapel of the Innocenti, 1488; and in the Palazzo Vecchio, 1481. His pictures include two 'Holy Families' (Berlin); 'Adoration of the Shepherds,' 1485 (Florence Academy); 'Madonna and Child with Saints,' 'St. Catherine of Siena,' and 'St. Lawrence,' in the Pinakothek at

Munich; 'Adoration of the Kings,' 1487; 'The Visitation,' 1491 (now in Louvre); 'The Birth of the Virgin,' 1490; 'The Calling of St. Peter and St. Andrew,' 1485 (Sistine Chapel, Rome). See Crowe and Cavalcaselle, *Italy*, ii. 459 (1866); Varari, iii. 253, 279.

Davide (1452-1525), and **Benedetto** (1458-97), brothers of Domenico, assisted him in his works, but left no original ones. Davide helped Domenico in the Mosaic of the 'Annunciation' over the N. portal of Florence Cathedral, and executed others at Orvieto, Florence and Siena.

Ridolfo (1483-1561), son of Domenico, was a skilful painter and friend of Raphael. His works include: 'Coronation of the Virgin,' 1503 (in Louvre); 'Annunciation' (Uffizi); 'Goldsmith' (Pitti Palace), formerly attributed to da Vinci; 'Nativity' (Berlin Museum); 'St. Zanobius raising a Dead Child,' 'Burial of St. Zanobius' (Uffizi, Florence); 'Madonna della Misericordia'; 'Virgin adored by Saints.'

See Marchesi, ii. 141; Blanc, *École florentine*; Vasari, *Vite* (ed. Milanesi), ii., 1678-85; Steinmann's 'Ghirlandajo' in Knackfuss's *Künstler Monographien*, 1897; Woltmann and Woermann, *History of Painting*, ii. 1901.

Ghizeh, see GIZEH.

Ghoorkhas, see GHURKAS.

Ghose, **Lalmohun** (otherwise **Lal-mohana Ghosha** (1849-1909), Bengali politician and orator; b. Dec. 17, at Krishnagar, son of Rai Bahadur Ram Lochun G., of a Vikrampur family. In the early seventies he was called to the Eng. Bar. In 1879 he returned to England to protest in a representative capacity against certain features in the policy of the viceroy, Lord Lytton. John Bright took the chair at one of his meetings. He came to England again in 1880, and again at the end of 1884; and, in the general elections of 1885-86, he stood as a Liberal for Deptford. Member of Bengal Legislative Council, 1892-95. In 1903, president of the Indian National Congress at Madras. Died at Calcutta, Sept. 18. Left an unfinished *Life of Napoleon*.

Ghūr, or **Ghore**, **Gaur**, **Gour** (Sanskrit, 'fort'), mountain region of W. Afghanistan, 120 m. S.E. of Herāt, stretching towards Kandahar. It is in part the site of the ancient Paropamisus, and mediæval Gharshistan. In all ages the country has been inaccessible, and the site of the old capital Firoz Koh cannot be definitely fixed. The peak Chalap Dalan or Koh-i-Kaisar is 13,000 ft. high. The present population are mostly Hagaras or nomad Aimaks. Since

1845 G. has been included in the territory of Herât. It was famous in the twelfth and following centuries as the seat of a native dynasty, the Ghûri, founded by Ala-ed-Din Jahan-soz, who burnt Ghazni, 1152, and harassed the Ghaznevids. His successors extended their empire and completely subdued Ghazni, 1186. Out of their victories grew up the Mogul kingdom of Delhi, and the preponderance of Islam in Hindustan dates from this time. Their power was broken by Mohammed shah, and Jelal ed-Din of Khwarezm (Khiva), 1214-6. A short revival took place under the Kurt dynasty, 1245, but the final overthrow came with Timur's capture of Herât, 1383. Consult Raverty's translation of 'Tabakât-i-Nâsirî' in *Bibl. Indica*; Ferrier, *Caravan Journeys*; *Journal asiatique*, xvii. See also AFGHANISTAN.

Ghûrkas, Goorkhas, or Ghoorkhas, the predominant race of Nepal in the Himalayan region. They are hardy mountaineers of Hindu descent, speaking a Sanskritic dialect. Driven out of Rajputana by Mohammedan invaders, they conquered Nepal after much fighting, 1767-8. The G. now form some of the best troops in the Anglo-Indian army. The East Indian Company came into conflict with them, 1814, but peace was soon declared, the company obtaining possession of the southern slopes of the Himalayas, but recognising Nepal's independence. G. is the name of a number of famous Indian regiments. They were loyal to England during the Mutiny and the Sirmoor Battalion greatly distinguished itself at Delhi, for which it was given the status of a 'rifle regiment' and granted a unique trophy called a 'Truncheon,' which much resembles a very ornate drum-major's staff made of silver. This unit is now the 2nd King Edward's Own Ghurka Rifles. There are now ten regiments of Ghurkas, all of which served during the Great War, either in France, Flanders, Gallipoli, Mesopotamia, Persia, Baluchistan, Egypt, Palestine or the N.W. Frontier of India. Their roll of battle honours commences with Bhurtapore and includes the Second and Third Afghan Wars, Burma Campaign, Indian Mutiny and China 1900 Campaign. King George V. is Colonel-in-Chief of the 1st and 2nd Regiments, and the Prince of Wales of the 4th Regiment.

Gianibelli (or Giambelli), Federigo (c. 1530-92), Italian military engineer, inventor of the 'infernal machines' that wrought so much havoc among the troops of Parma near Antwerp, 1585. By means of an explosive ship,

he destroyed the bridge built by the Spaniards across the Scheldt. G. then went to England and assisted in the preparations against the Armada, designing the fireships sent among the Spanish fleet. See Motley, *United Netherlands*, vol. i.

Giannone, Pietro (1676-1748), an eminent Italian anti-papal historian. He studied law and practised as a barrister at Naples, spending many years in composing his *magnum opus* — *Storia Civile del Regno di Napoli* (1723). This attack on the abuses of the Rom. Catholic Church led to his banishment. He retired to Vienna, Venice, and finally Geneva, where he wrote his diatribe *Il Triregno* . . . against papal authority. He was enticed into Savoy by Gussataldi (1736), arrested by order of the king of Sardinia, and confined at Turin till his death. His *Opere Postume*, containing 'Anecdotes Ecclesiastiques' (1738), appeared 1760. Mancini issued his *Opere Inédite*, 1859. See Panzini, *Vita di P. Giannone*, 1765; Fabroni, *Vite Italorum doctrina excellentium*; Pierantoni, *Autobiografia di P. Giannone*, 1890; Tipaldo, *Biografia degli Italiani illustri*; Corniani, *Secoli della Letteratura Italiana*.

Giants (Gk. γίγας, giant), the name given to adult human beings of abnormal size and stature. All races have a standard average height both for men and women. The average height of the whole human species is 65 in. (5 ft. 5 in.), the tallest G. exceeding this by about 46 in. The Akkas of Central Africa are about 53 in. in height, the Scottish farmers of Galloway 71 in. The true causes of such noticeable differences in racial stature are much discussed by ethnologists. The ancients held that the first men on earth were mighty and god-like, and that they degenerated in vigour and size. Others have tried to prove that the first men were of dwarfish appearance. Among famous G. may be mentioned Og, king of Bashan (Deut. iii. 11); Magrath, Bishop Berkeley's G.; Patrick Cotter (1761-1804); Charles Byrne; Winkelmaier's Austrian (d. 1887); Topinard's Finlander (112 in.); Chang, the Chinese G.; and the Russian Machnow (9½ ft.) who appeared at the London Hippodrome, 1905. Such abnormal beings are often dull of intellect, weakly, and ungainly. As a disease 'Giantism' is closely allied to 'acromegaly,' caused by a morbid process in the sphenoid bone of the skull, an excessive development of the anterior lobe of the pituitary body. If this condition occurs in early youth the whole of the limbs are affected and gigantic proportions are the result. Remains found in the Mentone

caves and in Scotland go to prove a giantism that was racial and not the result of disease. The villagers of Balmaclellan in Galloway are taller on the average than the oft-quoted Tehuelches of Patagonia. In mythology the title 'giant' was applied to men of pre-eminent strength or prowess, not necessarily of great size. Among the various Gk. conceptions were Euceladus, Pypheus, Briareus, the Titans, and the Cyclopes. The great representation of the *Γιγαντομαχία* (a mighty battle between the G. and gods, later than Zeus' overthrow of the Titans, but mentioned neither by Hesiod nor Homer) is sculptured upon the altar at Pergamum. See Taruffi, *Della macrosomia*, 1879; Bollinger, *Ueber Zwerg-und Riesenwuchs*, 1884; Weinhold, *Die Riesen des germanischen Mythos*, 1858; Wood, *Giants and Dwarfs*, 1868; Meyer, *Die Giganten und Titanen in der antiken sage und Kunst*, 1887; Tylor, *Early History of Mankind*, 1878, and *Primitive Culture*, 1891.

Giant's Causeway, a famous promontory of closely-packed basaltic columns on the coast of Antrim, N. Ireland, W. of Bengore Head, 8 m. from Portrush. Its true origin was a great outpouring of basalt in the Tertiary period, but legend ascribed it to Finn McCoul or Fingal, who built it as a bridge between Ireland and Scotland for the giants to cross from Antrim to Staffa. The columns are mostly hexagonal or pentagonal, about 40,000 in number, perfectly articulated by means of convex and concave joints. The three chief portions are the Little, Middle, and Grand Causeway. The last extends 500 ft. out to sea, and is 60 to 120 ft. broad. Other detached groups are called Giant's Loom, Saint's Organ, Lady's Fan. E. of the Causeway is the Giant's amphitheatre, a bay with cliffs 350 ft. high. Beyond is Spanish Bay, where an Armada vessel was wrecked. Chimney Point and Pleaskin Head are also near, and the ruined castles of Dunseverick and Dunlace.

Giants' Kettles, or Moulins, hollow, pot-shaped excavations, usually containing boulders, stones, and other debris, occurring in N. America and Europe, especially in Norway. They are believed to be due to summer heat having caused the melted surface ice to pour through the moulins or glacial chimneys until, loaded with gravel, stones, etc., by sheer force of impact it hollowed out deep excavations in the rocks beneath. The 'glacier garden' of Lucerne is a famous example. A similar process is now going on beneath the glaciers of the Alps.

Giaour (cor. from Arabic *kafir*, unbeliever, or Persian *gawr*, infidel), the name by which the Turks designate all those who reject Mohammedanism, especially European Christians. The word is spelt in the Italian fashion popularised by Byron, and usually employed in an offensive sense.

Giardino, Gaetano Ettore, Marshal of Italy; b. Jan. 25, 1864, at Montemagno; son of Carlo G. Began career, 1882, in 8th Rifles. In Eritrea 1889-94; in Lybia as lieutenant-colonel 1911-2. In Great War, Chief of Staff of 4th, 2nd, and 5th Army Corps, 1915-16; being then Major-General, chosen to command 48th division, employed at Gorizia. Lieut.-General June 14, 1917. Minister of War, June-Oct. 1917. Senator, June 21, 1917. Assistant Chief of Staff of Army, after Caporetto; completed defences at the Piave and Monte Grappa. Italian delegate to Supreme Council, Versailles, Feb.-April 1918. Commanded 4th Army at Grappa. General, Nov. 21, 1919. Had charge of Fiume, Sept. 1923 to April 1924. Minister of State, 1924. Marshal, June 15, 1926.

Gib, Adam (1714-88), a Scottish 'anti-burgher' leader and preacher, b. at Castletown, Perthshire. He was the only Edinburgh minister who strongly upheld the Protestant succession (1745). He led the minority in the Anti-Burgher Synod of 1747, and in after years his fame as a preacher drew enormous congregations to his church in Nicolson Street. He earned the sobriquet of 'Pope Gib,' on account of his dictatorial manner. Chief works: *Proceedings of the Associate Synod*, 1748; *The Present Truth*, 1774; *Sacred Contemplations*, 1786.

Gibara, a well-known Cuban seaport tn. on the N. coast of the prov. of Santiago de Cuba. It has a well-fortified harbour and civil and military hospitals. Trades in fruit, corn, tobacco, coffee, sugar. It is a port of call for the American Hudson Line. Pop. 7000.

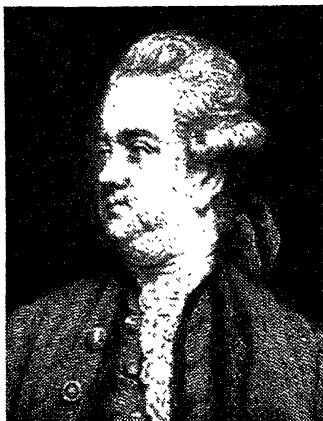
Gibbet, a species of gallows erected near the scene of a crime on which the convicted criminal was suspended in chains after his execution, by order of the courts of justice. The body thus hung, encased in an iron frame, was supposed to serve as a public warning to terrorise the evil-minded. This practice, legalised in 1752, was abolished in 1834. G. was the name of the highwayman in Farquhar's *Beaux Stratagem* who boasted himself as the best-conducted man in his profession. See *Hanging in Chains*, by Hartshorne, 1891.

Gibbon (*Hyllobates*), the smallest of the anthropoid apes, rarely exceeding

3 ft. in height, is found principally in the Malay Peninsula. The species include the hoolock (*H. hoolock*), a native of Assam, the *Choromandus*, Harlan's G. (*H. concolor*) from Borneo, the white-handed G. (*H. lar*), a native of Malacca and Siam, and the Siamang (*H. syndactylus*). This last, found in Sumatra, is the largest of the group, black in colour with a large laryngeal pouch. The Gs. are noted for their agility in climbing, their slim contour and length of arm contributing to this facility. Their loud voices and howling cries resound through the woods, particularly in early morning. They are gregarious, very intelligent, and easily tamed when young. See ANTHROPOID APES.

Gibbon, Edward (1737-94), the most celebrated of the Eng. historians, whose great work *The Decline and Fall of the Roman Empire* has placed him among the most celebrated of the world's historians. He was b. at Putney, the eldest child of Edward G. and Judith Porten, who had five other sons and one daughter. The Gs. were an old Kentish family. The historian's grandfather, Edward, was an enterprising and very prosperous London merchant, who lost a fortune in the South Sea Company's catastrophe, and built it up again by his extraordinary energy of character and his profound knowledge of commerce. His father was educated at Westminster and Cambridge, then became M.P. for Petersfield, a market-town near Buryton in Hampshire, where the G. estate was situated. His mother, often in poor health and claimed by the social duties inseparable from her husband's position, was reluctantly forced to yield up the care of her son in great part to her sister, Catherine Porten, to whose unremitting devotion G. pays a tender tribute in his autobiography. He was an extremely delicate boy, and his aunt nursed and watched him through the sicknesses to which he was a constant prey, educated him, too, whenever an interval of improved health afforded the opportunity. At seven he received some training in arithmetic, English, and Latin from a private tutor, and at nine he went to school at Kingston-on-Thames. His mother died in 1747, and after spending some months at Buryton, G. went to Westminster School in 1749. He passed many hours in his grandfather's library at Putney, and here he developed an enthusiastic love for reading. At school poor health caused his progress to be very slow. A course of treatment at Bath and at the house of a Winchester doctor proving futile, the idea of education at school was

given up and he was instructed henceforth intermittently by tutors. His love of reading, hitherto indiscriminating, now led him into a preference for history, and, when once interested in a subject of history, he devoured all he could find upon it in every book to which he could gain access, not reading the book all through but pursuing his subject into every hole and corner. Doubtless this instinctive 'method' laid the foundations of the clear-thinking and sense of proportion which enabled the future historian to mass the com-



EDWARD GIBBON

plicated materials of his vast picture. In his sixteenth year his health improved as if by miracle, his constitution became 'fortified and fixed,' and from that time onwards he was free from ailments. The same year (1753) he went to Oxford as a gentleman commoner of Magdalen College. Fourteen months of desultory reading and of gaiety, during which he read Bossuet and declared himself a Rom. Catholic, ended in his being expelled by an outraged university and sent by an angry father to Lausanne to the home of a Calvinist minister, M. Pavilliard, there to be brought to a better way of thinking. Under excellent guidance he here pursued a course of serious study, including the Latin classics, Locke, Grotius, Montesquieu, and Pascal, together with logic and mathematics. During this period he renounced his Rom. Catholicism, had some intercourse with Voltaire, and fell in love with Mlle. Curchod; but, his father

disapproving, he tells us: 'I sighed as a lover, I obeyed as a son,' and the lady afterwards became the wife of Necker, the famous Minister of Louis XVI. Returning to England in 1758, he published in 1761 a little book in Fr., *Essai sur l'Etude de la Littérature*. After two years of 'military servitude' as captain in the Hampshire militia, he set out on the 'Grand Tour.' In Paris the intellectual world welcomed him, and happy days were spent in Switzerland, but Rome was his bourn. Here, amid the ruins of the Capitol, in 1764, he conceived the idea of writing the *Decline and Fall*. Hardly daring to attempt so vast a work, he contemplated his idea 'at an awful distance,' for some years working laboriously and honestly, studying original records, inscriptions, medals, etc. His father's death in 1770 leaving him independent, he settled in London, became M.P. for Liskeard in 1774, and accepted a gov. sinecure, which supplemented his income by about £800 a year. Losing this on a change of gov., he retired to Lausanne and settled there with his great friend Deyverdun. In 1776 the first volume of the *Decline and Fall* was published. The work aroused tremendous enthusiasm, and was sold out in a few days, a second, and then a third edition becoming necessary. The next five years were wholly taken up with the gigantic labour of producing the succeeding volumes, the last of which appeared in 1788. G. died, in 1794, of a disease the existence of which he had hidden from his friends. G.'s *Decline and Fall* has borne the critical judgment of upwards of a century without losing its place as one of the foremost historical works of all time. It is unsurpassed for its comprehensiveness, its wealth of information, general accuracy and well-weighed decisions, together with its stately diction and charm of narration. Innumerable details have been made to yield up a 'philosophy of history' in the light of which characters, events, and conditions account for each other. The treatment varies according to necessity—here, complicated details are analysed to their foundation and their underlying philosophy is extracted, there, this philosophy is used to shed light on a period which, by its means, may be swept over rapidly; hampering details are cast aside, and the general trend of events stands out clearly. Defects there are, both of style and of judgment—gallicisms creep in easily, the stateliness sometimes becomes monotonous rhythm, the remarkable clearness occasionally fails. Worst of all, the calm judgment is sometimes obscured where G.'s pre-

judices and preferences are involved. Religion had no interest for him, and the famous fifteenth and sixteenth chapters would no doubt have been more acceptable to the intellect had he not offended the feelings by disobeying his own 'great law of impartiality' and let his love for Rome lead him into sarcasm in dealing with the early Christianity which he makes responsible for her downfall.

Bibliography.—*Essai sur l'Etude de la Littérature*, 1761 (an English translation appeared in 1764); *Mémoires Littéraires de la Grande Bretagne* (with Deyverdun), 2 vols., 1767, 1768; *Critical Observations on the Sixth Book of the Æneid*, 1770; *The History of the Decline and Fall of the Roman Empire*, vol. i., 1776; vols. ii. and iii., 1787; vols. iv., v., and vi., 1788; his *Indication*, 1779; *Antiquities of the House of Brunswick*, edited by Lord Sheffield, 1814; *Memoirs of my Life and Writings*, edited by Lord Sheffield, 2 vols., 1827; by H. H. Milman, 1839; G. Birkbeck Hill, 1900.

Gibbons, Grinling (1648–1721), the celebrated wood-carver and sculptor, b. at Rotterdam. He was brought to the notice of Charles II. by Evelyn, the diarist, and became master carver in wood to the Crown until the time of George I. Many of the carvings in Windsor, Kensington, and Whitehall are by him. He carried out commissions for Sir Christopher Wren, including the choir stalls of St. Paul's and woodwork in Trinity College, Cambridge. Chatsworth, Southwick, and Petworth were all beautified by his art. In sculpture he was scarcely less successful, as is evidenced by his monument to Newton in Westminster Abbey, and the bronze statue of James II. in Whitehall. He also designed the base of Charles I.'s statue at Charing Cross, and that of Charles II. at the Royal Exchange.

Gibbons, James (1834–1921) Irish-American Rom. Catholic bishop and cardinal, b. July 23, in Baltimore, Md. From infancy until 1853 he lived in Ireland. He was ordained in 1861 and made vicar apostolic of N. Carolina in 1868. Four years later he was promoted to the see of Richmond, Virginia, and in 1877 he was appointed primate of the United States. Leo XIII. created him a cardinal in 1886. Chief works: *The Faith of our Fathers*, 1871; *Our Christian Heritage*, 1889; and *The Ambassador of Christ*, 1896. Died at Baltimore, March 24.

Gibbons, Orlando (1583–1625), an Eng. musician and a celebrated composer of church music, b. at Cambridge. He took the degree of Mus. Doc. at Oxford in 1622, and was made organist of Westminster Abbey

in the following year. He died suddenly at Canterbury while waiting to take part in Charles I.'s marriage service, for which he had composed the music. Orlando G. marks the apotheosis of the ancient Eng. musical art and with him the old Church School of England may be said to cease. His compositions are still in frequent use in the church services to-day. The most famous are: *Morning and Evening Service in F.*: anthems: *Hosanna, O Clap your Hands, and God is gone up*; madrigals: *The Silver Swan, and Dainty Sweet Bird*. He also composed some beautiful chamber music.

Gibbs, Josiah Willard (1837-1903), American physicist, was b. Feb. 11, at New Haven, Conn., son of a philologist bearing the same names. Graduated at Yale, 1858; and, pursuing studies there, became Ph.D. in 1863. For three more years he remained as tutor; afterwards studied at Paris, Berlin, and Heidelberg. From 1871, Professor of Mathematical Physics at Yale. Although his scientific papers were not numerous, all were important. His fame was made by a paper, pub. in the *Transactions* of the Connecticut Academy, 1875-8, and entitled 'On the Equilibrium of Heterogeneous Substances,' which led to the establishment of the 'phase rule' of chemical equilibrium and change. Other papers:—*Graphical Methods in the Thermo-Dynamics of Fluids*, 1873; *Methods of Geometrical Representation of the Thermo-Dynamic Properties of Substances by Means of Surfaces*, 1873; and treatises on the electro-magnetic theory of light (1882-3) and on vapour densities. He d. at New Haven, where nearly all his life had been spent, April 28.

Gibbs, Sir Philip (b. 1877), Eng. journalist and novelist. Entered journalism in 1902 as a literary editor on various London dailies, and later was a descriptive writer. In 1912 he was war correspondent with the Bulgarian army, and in the Great War was one of the limited band of war correspondents accorded special privileges. His very human and somewhat emotional treatment of scenes at the front, which appeared in the *Daily Chronicle*, enjoyed great popularity. Knighted in 1920. His novel *Street of Adventure* is a sketch of life in Fleet Street. Other novels include *The Reckless Lady*, 1924; *Unchanging Quest*, 1925. Has also written several works on the war and related topics, such as *The Battles of the Somme*; *Realities of War*; *The Hope of Europe*, etc.

Gibeon, an ancient city of Palestine, 5 m. N.W. of Jerusalem. The village of El-Jib now occupies the

site, which is a solitary hill overlooking a corn valley. It is now chiefly remarkable for its springs, but in biblical history it is famous as the scene of the combat between the fighters of David and those of Ish-bosheth (2 Sam. ii. 12-32), of the murder of Amasa by Joab (*ib. xx. 8-10*), and especially of the bloody battle in which Joshua overcame the five kings of the Amorites who were besieging the town because the inhabitants had made a treacherous covenant with the enemy of all the Canaanites. The Gibeonites had previously been brought into bondage by Joshua, that is, made 'hewers of wood and drawers of water unto all the congregation,' because they had won from him a truce by deceit and trickery (Josh. ix., x.).

Gibraltar (Moorish *Gebel-al-Tarik*, or *Jebel-el-Tarik*), a strongly fortified tn. and promontory in extreme S. of Andalusia, Spain, forming the E. horn of the Bay of Algeciras or G., N. of the Strait of G. (anc. *Fretum Herculeum*) connecting the Atlantic and Mediterranean Sea. G., as *Mons Calpe*, and Mt. Atyla (Apes' Hill) on the African coast opposite, were known to the ancients as the famous 'Pillars of Hercules,' and considered by them to be the western extremity of the world. The great promontory, of brownish-grey limestone or marble, is connected with the mainland by an isthmus of sand. It is shaped like an 'enormous lion,' 3 m. long, averaging $\frac{2}{3}$ m. broad, reaching upwards over 1400 ft. above sea-level, except on the W., where it slopes more gently to the sea. Though barren in appearance its vegetation includes capers, asparagus cacti, and aloes, and its fauna, partridges, woodcocks, pigeons, rabbits, and small monkeys (Barbary apes), the only native monkeys of Europe. There are numerous caverns and galleries cut out in the rock, the largest being St. Michael's, with a hall 230 ft. long. The Spanish lines are near the point of junction of the 'Rock of Gibraltar,' and the mainland, the space between being called 'Neutral Ground.' The fine harbour has two moles, 1100 and 700 ft. long. A signal-house and a lighthouse are situated by Europa Point on the S. The town has three main divisions: N. town, S. town, and the lighthouse. Alameda Park, the great central garden, contains some fine public buildings. Among the chief are the governor's residence or 'convent,' the admiralty, naval hospital, exchange, barracks, and theatre. G. is the see of an Anglican and a Rom. Catholic bishop. The Anglican cathedral or church of the Holy Trinity is in Moorish style. There are

also Protestant and Roman Catholic churches, Jewish synagogues, public schools and libraries. A crown-colony of Great Britain controlled by a governor, G. is of extreme importance as a coaling station and for its control of the Mediterranean Sea. It has been a free port since 1704, but, for revenue purposes, there are import duties on malt-liquors, wine and spirits, tobacco, motor spirits and perfumery. Industries are of no importance, but there is a fair transit trade at the port and G. is becoming a popular tourist centre. There is cable communication with the Continent, Tangier, the Mediterranean Eastern ports and England. The fortress was taken, A.D. 711, by the

Herculeum), the entrance from the Atlantic to the Mediterranean, having a length of 50 m. and a breadth varying from 9 to 23 m. It is flanked on the N. by Spain, on the S. by Morocco in Africa.

Gibson, Charles Dana, b. Sept. 14, 1867, at Roxbury, Mass., son of Chas. de Wolf G. Attended for one year the schools of the Art Students' League in New York, and first drew for the comic weekly, *Life*. It was his portrayal of the American girl, especially of an idealised type, in which health, refinement, and extreme dignity were suggested, that established his name and made magazines vie with one another for his drawings of what



GIBRALTAR

[Canadian Pacific

Saracen chief, Tarik ibn Ziad. The Moors finally ceded it to Spain, 1462. After 1510 it was extensively fortified by Charles V. In 1704 it was captured by the Eng. and Dutch under Rooke. It was subsequently often besieged by the Spaniards, notably 1779-83, when it was gallantly defended by Heathfield against the united French and Spanish. Since 1897 a new mole and enclosed deep harbour have been built at the N. end. The civilian population was estimated in 1928 to be 18,719. The military pop. is about 3000, of whom some 2200 are males; the naval pop. is approx. 550. The settled population are chiefly descendants of Spanish and Italian settlers. See Drinkwater, *History of the Siege of Gibraltar*, 1785; Mann, *History of Gibraltar*, 1870; Field, *Gibraltar*, 1889; 'Memoir of Elliot' in Green's *Siege of Gibraltar*, 1784; Monti, *Historia de Gibraltar*, 1851; Sayer, *History of Gibraltar*, 1862.

Gibraltar, Strait of (ancient *Fretum*

came to be known as the 'Gibson' girl. After having made a fortune by contributing to *Collier's Weekly*, in which appeared the famous 'Education of Mr. Pipp,' G. essayed portraiture in oils, but eventually returned to his designs in pen and ink.

Gibson, Edmund (1669-1748), an English divine, who in 1692 brought out an improved English translation of Camden's *Britannica*. His great work was his *Codex juris ecclesiastici Anglicani* (1713), written to plead the privileges of the Convocation.

Gibson, John (1790-1866), an Eng. sculptor, was the son of a market gardener. For some years he worked in the studio of Canova, and later became for a time the pupil of the Danish Thorwaldsen. But the old Gk. sculptors were his true masters, and their influence is reflected in his works. Thus it was Gk. mythology which supplied him with his subjects, 'Bacchante and Faun,' 'Amazon thrown from her Horse,' 'Proser-

pine,' 'Sappho and Psyche,' etc. It was the knowledge that Pheidias and Praxiteles had coloured their statuary that suggested to him the tinting of his 'Venus' (1854), and other of his works, a process which was naturally regarded as a daring innovation. It was, moreover, in classical garb (the Rom. toga), that he insisted on representing Peel, whose fine statue now adorns Westminster Abbey, and Huskisson, whose colossal marble figure now stands in the Cemetery of Liverpool. But the above are merely external illustrations of his paganism in art. In his *bassi rilievi*, such as 'Hours leading the Horses of the Sun,' he shows the truly Gk. appreciation for the serenity and natural limits of the plastic art. Among his many imposing monumental works may be mentioned the group of Queen Victoria with Clemency and Justice in the Houses of Parliament.

Gibson, Wilfrid Wilson (b. 1878), British poet. Was for a time a social worker in the East End of London, and during the Great War he served in the ranks. These experiences form the background of much of his work. Most of his poems—notably the seventeen dramatic pieces which make up *Daily Bread* (1910) and the work *Livelihood* (1917) present the normal toiling life of man in our modern industrial world. The talk and thoughts of the factory folk are modulated into verse, in which the figures are significant rather than symbolical, and in which the poignant experience, when it finds a place, is uttered in the heroic and non-sentimental strain. There is nearly always a story even in his shortest pieces, and the story is generally full of interest. Some of the most striking of his individual pieces are *Krindlesyke*, *Flannan Isle* and *The Ice-Cart*. His poems include, besides those mentioned, *Stonefolds*, 1907; *Fires*, 1912; *Thoroughfares*, 1914; *Borderlands*, 1914; *Battle*, 1915; *Friends*, 1916; *Whim*, 1918; *Home*, 1920; *Neighbours*, 1920; *I Heard a Sailor*, 1925; *Collected Poems* (1905–25), 1926; *The Golden Room*, 1928.

Giddings, Joshua Reed (1795–1864), an American statesman, sat from 1838 to 1859 in the national House of Representatives, first as a Whig, later as a Free-soiler, and eventually as a Republican. The abolition of slavery was very materially assisted by his able and outspoken speeches. When the slaves of the *Creole* slew their captain and claimed their liberty (1841) he courageously asserted that in 'resuming their natural rights to liberty' they 'violated no law of the U.S.A.' In 1842, when congress

passed a vote of censure on him, he resigned his seat, but his immediate re-election proved that the public fully recognised the value of his disinterested and splendid work.

Gide, André-Paul-Guillaume, Fr. novelist and critic, b. Nov. 21, 1869, in Paris. Educated at Ecole Alsacienne and Lycée Henri IV. At one time conducted *La Nouvelle Revue Française*. Works include: *Les Cahiers d'André Walter*, 1891; *Les Poèmes d'André Walter*, and *Voyage d'Urien*, 1892; *La Tentative Amoureuse*, 1893; *Paludes*, 1895; *Les Nourritures terrestres*, 1897; *Le Prométhée mal enchaîné*, and *Philoctète*, 1899; *Lettres à Angèle* 1898–99, 1900; *Le Roi Candaulé* (drama), 1901; *L'Immoraliste* (his masterpiece), 1902; *Saül* (drama), *Prétexes*, 1903; *Amyntas*, 1904; *Le Retour de l'Enfant Prodigue*, 1907; *Dostolersky d'après sa Correspondance*, 1908; *La Porte étroite*, 1909; *Oscar Wilde*, 1910; *Nouveaux Prétexes* and *Isabelle*, 1911; *Bethsabé*, 1912; *Les Caves du Vatican*, 1914; *La Symphonie pastorale*, 1919; *Corydon*, and *Si le Grain ne meurt*, 1920; *Numquid et Tu . . . ?* 1922; *Incidences*, 1924; *Caractères*, 1925; *Les Faux-Monnayeurs*, and *Le Journal des Faux-Monnayeurs*, 1926; *Dindiki*, and *Voyage au Congo, Faits divers*, 1927; *Le Retour du Tchad*, 1928. What G. seems to be driving at is that sincerity is the prime virtue and consists in having no fixed beliefs.

Gide, Charles, Fr. political economist; b. June 29, 1847, at Uzès (Gard); son of Tancrède G., president of the Tribunal of Uzès. Educated at Collège d'Uzès and at Faculté de Droit in Paris. Professor of Jurisprudence at Bordeaux, 1874–80; Professor of Political Economy at Montpellier, 1880–1898; Professor at University of Paris, 1898–1920. Early became attached to Christian Socialist movement. Works include: *Principes d'Economie politique*, 1884; *La Coopération*, 1900; *Les Sociétés coopératives de Consommation*, 1904; *Economie Sociale*, 1905; *Cours d'Economie politique*, 1909; *Histoire des Doctrines économiques* (with Chas. Rist), 1909; *Premières Notions d'Economie politique*, 1921; *La Coopération à l'Etranger—Angleterre et Russie*, 1926; *Les Colonies communistes et Co-opératives*, 1930.

Gideon, a warrior judge of Israel, won the title of Jerubbaal ('Let Baal plead'), for destroying the heathen god's altar at Ophrah, his birthplace, and seems in his youth to have tried to rouse the people from their idolatry and sloth. But his great achievement was to overwhelm the Midianites at the bloody battle near Mt. Gilboa.

These people were continually making inroads for rapine, and G. believed that Jehovah had directly inspired him to lead the chosen people against them. The fruits of this struggle were a peace of forty years. The higher biblical criticism has revealed the fact that the G. story is inconsistent, and probably a coloured and dramatic version of what actually occurred.

Giesebrecht, Friedrich Wilhelm Benjamin von (1814-89), a Ger. historian, held the chair of history both at Königsberg (appointed 1857) and at Munich (1862), and left behind him a long series of historical works. Of these the most valuable and exhaustive is his *Geschichte der deutschen Kaiserzeit* (1855-94), which treats of no events later than 1181. A translation of Gregory of Tours (1851), *Deutsche Reden* (1851), and *Arnold von Brescia* (1873) are his publications.

Gieseler, Johann Karl Ludwig (1793-1854), a Ger. writer on Church history, graduated in philosophy from Halle in 1817, and in the following year was appointed director of the gymnasium at Cleves. In 1819 he was appointed to the chair of theology at Bonn as the result of his *Entstehung und die frühesten Schicksale der schriftlichen Evangelien*, wherein he disproved the existence of a primitive written gospel. In 1831 he accepted a similar position at Göttingen. His *magnum opus* is his *Lehrbuch der Kirchengeschichte* (5 vols.), 1824-57. In this work he gives the world the benefit of his profound learning and carefully-sifted information, and may not unfairly be associated with Neander, though he could not grasp with the same intensity the fullness of the spiritual life of Christian churches.

Giessen, the cap. of the prov. of Upper Hesse, 16 m. S. by W. of Marburg, connected by rail with Cassel, Coblenz, and Cologne, in the grand-duchy of Hesse-Darmstadt, Germany. Situated amid picturesque surroundings at the confluence of the Lahn and Wieseck, it has a university (founded in 1607), whose chemical laboratory was the scene of the valuable researches of Liebig (1824-52), and manufactories of woollen and cotton goods, leather, tobacco, machinery, etc. Pop. 33,000.

Giffard, Godfrey (c. 1235-1302), Bishop of Worcester and Chancellor of England, son of Hugh G., of Boyton, Wilts—a royal justice—and younger brother of Walter G. (q.v.), to whom he owed advancement. Became canon of Wells and rector of Mells; Archdeacon of Barnstaple 1265-67. Walter, becoming Chancellor, made Godfrey Chancellor of the Exchequer, 1266. The same year

Godfrey succeeded to the Chancellorship of England. Archdeacon of York and rector of Adlingfleet, 1267. Became Bishop of Worcester, 1268, and soon afterwards resigned Chancellorship—though still often employed on state business. Died at Worcester, Jan. 26.

Giffard, Walter (d. 1279), Archbishop of York; b. probably before 1235, elder brother of Godfrey G. (q.v.). Became canon and Archdeacon of Wells. Bishop of Bath and Wells, May 22, 1264. Made Chancellor of England after Battle of Evesham. Pope Clement IV. appointed him Archbishop of York, Oct. 15, 1266, and he resigned Chancellorship. G. received great seal on death of Henry III., was principal of the three governing England till new king's arrival (Aug. 2, 1274), and one of the guardians of England during Edward I.'s absence in 1275. Died at York, about April 22.

Giffen, Sir Robert (1837-1910), a British statistician and writer on finance. From 1876 dates his association with the Board of Trade, where he served as chief statistician, assistant secretary (1882), and controller-general (1892-7). His chief publications were: *Essays on Finance*, 1879 and 1884; *The Growth of Capital*, 1890; and *Economic Inquiries and Studies*, 1904.

Gifford, William (1757-1826), an Eng. political writer and man of letters. Early left an orphan, he was rescued from a 'state of savage melancholy' by Cooksley, a local surgeon, who sent him to school and afterwards to Oxford. His ability and sad story persuaded Lord Grosvenor to appoint him tutor to his son and to afford G. his home as an asylum (1782). From this time forth G. devoted himself to writing. His *Baviad* (1794) and *Mæviad* were powerful satires directed against the Della Cruscan of Florence, and the ineptitudes and corruption of modern dramas respectively. In politics he was an enthusiastic admirer of Pitt, a good hater of the Fr., and a bitter opponent of Radical principles. Among his illustrious associates were Pitt, Canning, Frere, and the Marquis of Wellesley. G. was the first editor of the *Quarterly Review*, with which he was connected from 1809 to 1824, but though by his vigorous political partisanship he secured for it an ever-increasing circulation, he nevertheless blackened its pages with a cruel and prejudiced attack on Keats' *Endymion*, and many similar onslaughts on the writings of Shelley, Lamb, Hazlitt, and others. See Hazlitt's Open Letter to him.

Gift means a transfer of property

without valuable consideration (*q.v.*) to a person who accepts the property either by himself or through his trustee. To constitute a G. there must be both a complete transfer and an intention to give. As to what amounts to the former, much depends on the nature of the property. Such a movable chattel as a bicycle would require no more than delivery accompanied, as the law says, by *verba de presenti doni* (i.e. by words indicating that a G. is made). The transfer need not, however, be to the person intended to be benefited, but may be to a trustee for the benefit of the donee. A donee is not bound to accept a G., but if the G. be made by deed, it vests in the donee without acceptance until he repudiates it. A promise to make a G. in the future gives no right whatever. An infant may accept a G. and repudiate it on attaining twenty-one. A *donatio mortis causa* is a G. made by a man in contemplation of his death from an existing illness. Following the principles of the civil law (*q.v.*), the law is that a 'death-bed G.' is made only on condition that the thing shall be returned if the donor recovers, and that it is revoked by the predecease of the donee. A *donatio mortis causa* is ineffectual without delivery, either to the donee or some one on his behalf. It appears to be settled law that bank shares, railway stock, consols, and building society shares cannot be the subject of a *donatio mortis causa*, and cheques given must be cashed or negotiated before the donor dies. Delivery of the key of a safe would be effectual to pass securities in the safe.

Gifu, a tn. of Japan, manufacturing silk and paper goods, near Lake Biwa, on the Central Railway in the 'ken' or gov. of Central Nippon, of which it is the capital. Pop. 45,000.

Giga, more commonly called **Gigue**, was originally always a sprightly dance measure in $\frac{3}{4}$, $\frac{3}{8}$, or $\frac{3}{2}$ time, being often introduced into the suites of Bach and other old masters. 'Jig,' as in 'Irish jig,' is another form of G.

Gijón, a seaport on the Bay of Biscay, 11 m. N.N.E. of Oviedo, in the prov. of Oviedo, Northern Spain. When, in 1884, the town was connected by rail with Langreo, the great coal-mining centre, and with Avilés and Oviedo, the foundation of its present commercial prosperity was laid. Its exports, including iron, copper, zinc, fish, and agricultural produce, amount to about £120,000 annually; its imports, which consist chiefly of machinery, timber, and food-stuffs, amount to about £700,000. Moreover, G. has its own blast-furnaces, glass, tobacco, and

china factories, and petroleum refineries, besides the finest harbour between Santander and Ferrol. Charles V. made the first quay (1552-4), and since his day it has been many times reconstructed. The old town is perched on the promontory of Santa Catalina, the modern portion covering the shore between Capes Torres and San Lorenzo. The bull-ring in the latter quarter accommodates 12,000 spectators. Pop. 56,000.

Gila Monster, the popular name for the poisonous lizard called *Heloderma suspectum*, which frequents the sandy wastes of Arizona, Texas, and New Mexico. In colour it is bright orange and black, and its victims are chiefly birds and small animals.

Gilbert, or **Kingsmill Islands**, an archipelago annexed by Great Britain in 1892, consisting of sixteen atolls, bisected by the equator, and extending between the limits of 170° and 180° E. They were discovered in 1765 by Commodore Byron, after whom one island is named. Taputeneia is the largest, Butaritari or Pitt perhaps the most important, and despite their limited land area (166 sq. m.) and the fact that they produce only coconuts and screw-pines, they are very densely populated (30,000) by dark, tall, muscular, and warlike Polynesians, who depend chiefly on fish for their subsistence.

Gilbert, Alfred (b. 1854), a British sculptor and goldsmith, studied under Cavalier at the Ecole des Beaux-Arts in Paris and also in the studio of Sir Edgar Boehm, R.A. At Rome and Florence he was an enthusiastic admirer of the masterpieces in the galleries of sculpture, and his admiration is reflected in his 'Mother and Child' and 'Perseus Arming,' which were assuredly inspired by Renaissance work. His 'Icarus' attracted much attention in the Royal Academy Exhibition of 1884, but of his work known to the general public the most highly appreciated is the 'Shaftesbury Memorial Fountain' (1885) in Piccadilly, London, which amply expresses his originality and true decorative sense. G. also executed the statue of Queen Victoria at Winchester (1888), the 'Memorial to the Duke of Clarence,' and fine busts of G. F. Watts, Sir Henry Tate, and many others. In gold he wrought a fine mayoral chain for Preston, an épergne for Queen Victoria and a St. George. In 1889 he received the Grand Prix at the Paris International Exhibition, and in 1892 became R.A., but resigned that honour in 1909. Received Brit. Sculptors' Society Gold Medal, 1926.

Gilbert, Cass, American architect,

b. Nov. 24, 1859, at Zanesville, Ohio; son of Gen. Samuel Augustus C. Educated common school, Zanesville; St. Paul; and Mass. Inst. Tech. LL.D. of University of Michigan, and Oberlin and Middlebury Colleges. Began practice in 1883. Is noted for his 'sky-scrapers'—especially the Woolworth Building, New York—(see ARCHITECTURE). He was architect of the Capitol and other buildings at St. Paul; Essex County Court House, Newark, N.J.; Agricultural Building, Omaha Exposition, 1897; U.S. Custom House, New York; Festival Hall, St. Louis Exposition; Central Public Library, St. Louis; Detroit Public Library; general plans of University of Minnesota, University of Texas, and completion of Arkansas Capitol at Little Rock; U.S.A. Treasury Annex, Washington, D.C.; W. Virginia State Capitol; U.S.A. Chamber of Commerce. Appointed by Pres. Roosevelt chairman of Council of Fine Arts; by Pres. Taft, memb. of the Commission of Fine Arts—reappointed by President Wilson. President American Inst. of Architects, 1908-9; President National Academy of Design, 1926-27. (See also ARCHITECTURE.)



SIR HUMPHREY GILBERT

Gilbert, Sir Humphrey (c. 1539-83), an English navigator, was educated at Eton and Oxford, and had served as a soldier in Ireland and the Netherlands, been in parliament, and published his famous *Discourse on a North-West Passage to India*, 1576, before he finally obtained his much-coveted patent from the queen to 'discover and possess' remote 'heathen lands

not actually possessed of any Christian prince or people.' The immediate result of this charter was the fruitless expedition of 1578-79, when Raleigh sailed in his company. In 1583 he fitted out another fleet, formally occupied Newfoundland, where he landed, in Elizabeth's name, and having planted the first English colony, was on his way home when the little frigate, the *Squirrel*, in which he insisted on sailing, capsized, and the *Golden Hind* was left to carry home the tidings of their leader's untimely death.

Gilbert, Sir John (1817-97), an English painter, sketched and drew from his earliest childhood, and seems chiefly to have been his own teacher, for his only lessons in art were received from Lance, the fruit painter. At first he exhibited drawings at the Society of British Artists, then from 1837-67—the year of its close—he sent oil paintings to the British Institution; between 1883 and 1851, and again from 1867 to his death, he contributed in oils to the Royal Academy, of which he became a full member in 1876, and finally 270 of his water-colours were hung from 1852 onward in the gallery of the Old Water Colour Society, of which he became president in 1871. The success, moreover, of the *Illustrated London News* is said to have been due not a little to his engravings. Nearly all his subjects are historical, and a breadth of style, a vigour of conception and a rich and harmonious coloration characterise all his work, but his paintings in water-colour exhibit these merits in the highest degree. A few of his works are 'Don Quixote and Sancho Panza,' 1841; 'Rembrandt,' 1867; 'Richard II. resigning his Crown' (at Liverpool); 'Morning of Agincourt,' and 'Naseby,' 1873, one of the most splendid of his designs.

Gilbert, Sir John Thomas (1829-98), the founder of the Public Record Office in Dublin, was for many years (1855-89), in charge of the library of the Royal Irish Academy—an office which he found very congenial, as it gave him every facility for satisfying his passion for history and antiquities. He edited the civic records of his birthplace, Dublin, as far back as 1730, and was the author of a *History of Dublin*, 1854-59; *Historical Essays on Ireland*, 1851; and *Contemporary History of Affairs in Ireland, 1641-1652* (1880).

Gilbert, William (c. 1540-1603), the father of the science of magnetism, studied in Cambridge and Italy, and about 1573 was admitted to the College of Physicians in London. Queen Elizabeth made him her physician-in-ordinary, but his fame rests on a far

more substantial basis than royal favour, for in 1600 he published his exhaustive and original treatise on magnetism, viz: *De Magnete, magnetice corporibus, et de magno magnetice tellure*—a work which earned him the admiration of Galileo and an encomium from Erasmus containing the words (he is) 'great to a degree that is enviable.' In his realisation of the affinity and essential difference of magnetism and electricity, and of the communicability of telluric magnetism, in his fine conception of the whole earth as a great magnet influencing the direction of the magnetic needle N. and S., and his invention of terms 'electric emanations' and 'electric attractions,' etc., he may be said to have established all the 'fundamental facts' of his science. See the English translation of *De Magnete* by S. P. Thompson, London, 1900.

Gilbert, Sir William Schwenck (1836–1911), an English humorist and playwright, was the son of a novelist, and a descendant of Sir Humphrey Gilbert, the explorer. His schooling was received in Boulogne and Ealing, and in 1856 he graduated from King's College as a B.A. of the University of London. For four years (1857–61) he led a clerk's life in the education department of the Privy Council, but finding such an existence too slow, decided to follow law, and was called to the bar in 1864. From this time onward his time was largely occupied with all manner of literary activities, though he found time to serve as magistrate for Middlesex (1891), and to hold a captaincy in the volunteers. For many years after 1861, G. was a popular contributor of comic verse and illustrations, signed 'Bab,' to *Fun*, and his *Bab Ballads*, which appeared in 1869, were merely a collection of his contributions. These lyrics, together with *More Bab Ballads*, and *Songs of a Savoyard*, are full of splendid nonsense and of graceful whimsicalities. For sometime G. acted as dramatic critic for the *Illustrated Times*, and it was his work on this paper which turned his attention to the stage. From 1866, the year of his success with a burlesque entitled *Dulcamara*, he continued to write original plays, among them being a clever fairy play entitled *The Palace of Truth*, 1870; *Pugmation* and *Galatea*, a 'mythological comedy,' 1871; *Sweethearts*, 1874; and *Dan'l Druce*, 1876. *Fogerty's Fairy and other Stories* is the best collection of his tales, most of which first appeared in magazine form. His famous partnership with Sir Arthur Sullivan dates from 1871. At first at the Royalty and later at the Savoy, under the management of

Richard D'Oyly Carte, there appeared in rapid succession a series of delightful operas, of which G. was the librettist, the most popular of them being *H.M.S. Pinafore*, 1878; *The Pirates of Penzance*, 1880; *Patience*, 1881; *Iolanthe*, 1882; *The Mikado*—perhaps the masterpiece, 1885; *Rudigore*, 1887; *The Gondoliers*, 1889, and *The Yeoman of the Guard*, 1888. The last named undoubtedly containing some episodes of true poetry. These operas are one and all animated by a rich vein of humour which consists in 'a logical topsy-turvydom,' and of sly hits at the follies and foibles of the day, the satire being of such a disarming urbanity as to be free from all the odium which usually attaches itself to satirists.

Gilbey, Sir Walter, Bart. (1831–1914), a wine merchant, b. at Bishop Stortford, Hertfordshire. He volunteered for civilian service in the Crimea, and after his return founded the well-known firm of wine merchants, W. and A. Gilbey. His spare time was devoted to the improvement of the breeds of English horses, on which subject he wrote some standard works. He was president of the Royal Agricultural Society in 1895. His writings include: *History of the Great Horse or War Horse*, 1888; *Ponies Past and Present*, 1900; *Horse Breeding in England and India*, 1901; *Modern Carriages*, 1904; *Farm Stock One Hundred Years Ago*, 1910, etc., and a volume on agriculture from George III. to George V., *The Royal Family and Farming*. Died Nov. 12.

Gilboa (cor. probably of Heb. *Gib'ath habba'al*, hill of Baal), a chain of hills in Palestine between the plains of Esdraelon and the valley of the Jordan, now called Jebel Fukua. Famous for being the scene of the death of King Saul and his three sons after the Philistines had defeated them.

Gild, see **GUILDS**.

Gildas, or **Gildus** (c. 516–70), an early English historian about whom little is known. He was surnamed 'Sapiens' and also 'Badonicus' from the battle of Mt. Badon, fought between the Saxons and the Britons. Our sole knowledge of history during the fifth century is derived from his treatise, *De Excidio Britannice*, published by Polydore Vergil in 1525 and translated into English by Habington (1638).

Gilder, Richard Watson (1844–1909), an American poet and editor, b. at Bordentown, New Jersey. He served as a private during the Civil War. Entering journalism he founded the *Newark Register* with Newton Crane, becoming subsequently assistant editor of *Scribner's Monthly*, and editor-in-chief of the *Centurys* in succession to Dr. Holland (1903). He

was one of the founders of the International Copyright League, and took an active interest in all public affairs. Chief works: *The New Day*, 1875; *Lyrics. The Celestial Passion, The Great Remembrance, Two Worlds* (collected in *Five Books of Songs*, 1894), *Poems and Inscriptions Letters and Speeches of A. Lincoln*, 1901; *In the Heights*, 1905; *Collected Poems*, 1908.

Gildersleeve, Basil Lanneau (1831-1924), an American professor and philologist, son of the Rev. Benjamin Lanneau, was b. at Charleston, South Carolina. He studied at European and American universities. In 1856 he was made Greek professor in the university of Virginia; professor of Latin at the same university in 1861; first Greek professor at Johns Hopkins University in 1876. Chief works: *Latin Grammar*, 1867; *Latin Series*, 1875; *Greek Syntax*, 1900; *Hellas and Hesperia*, 1909; and editions of *Persius*, 1875; *Odes of Pindar*, 1885. He also founded and edited the *American Journal of Philology*.

Gilding, the art of covering surfaces with gold by mechanical or chemical means for ornamental purposes. According to Herodotus and Pliny the custom was in use among the ancient Egyptians and also the Romans after the siege of Carthage. The thickness of the gold leaf they employed accounts for the comparatively solid traces extant. The art is seen to perfection in the native processes still pursued in India. G. in modern days is widely employed. The various processes used are as follows: (1) Leaf-gilding in which pieces of gold leaf are applied to the surfaces by hand and with adhesives. This is the method employed in church and interior decoration, and also by the shopfitter, picture-frame maker, and the bookbinder, though the latter uses heat or pressure, or both, as well. (2) The application of finely-divided gold powder instead of leaf is used extensively in the decoration of glass, pottery and porcelain. (3) Chemical or electro-chemical deposition. In this process the plating is effected by depositing the gold from solution by means of the electric current generated by dynamo or battery. The articles to be gilded are first washed free from grease, those of Britannia metal, tin, zinc, lead, or pewter being given a thin preliminary film of copper or brass before immersion in the gold solution. This may be prepared in two ways: (1) Electrodes composed of gold sheets are hung by means of platinum wires in a hot solution of potassium cyanide and connected up to a special dynamo or battery. (2) By dissolving the cyanides of gold and potassium in dis-

tilled water. The articles are hung in this solution or, if of small size, are supported in a perforated stoneware carrier. The anode is formed by a gold plate larger in area than the surface of the articles to be plated. The latter are connected with the negative pole of the battery or dynamo. The plating solution is frequently agitated while the process is being carried out and is kept at a temperature of about 110° F. It is probable that some of the new methods used in coating metals, such as the Sherardising process, may be successfully applied to G.

Gilead ('hard' or 'rugged'), a fertile mountainous tract of country traversed by deep ravines, situated in Palestine to the E. of the Jordan. It is bounded on the N. by the R. Yarmak (Hieromax) and on the S. by the Arnon. The tribal land of Gad also seems to have formed part of it. Jephthah and Elijah belonged to this beautiful country. Josephus sometimes mentions it as divided into small provinces called after the capitals established by Greek colonists in the time of the Seleucidae. The chief towns of G. were: Jabesh, Mizpeh, Jazer, Penuel, Succoth, Ramoth-Gilead, Mahanaim, and later Pella and Gerasa. See Laurence Oliphant, *The Land of Gilead*, 1880.

Giles, Ernest (1839-97), an Australian explorer, b. at Bristol, and educated at Christ's Hospital, London. He went to Australia at an early age, and in 1872 made an expedition into the interior, which resulted in the discovery of Lake Amadeus. He crossed from Adelaide to Perth about the parallel of 30° S. latitude (1874-76), and recrossed the country between the 24th and 25th parallels, the journey being undertaken on camels. G. proved the interior, W. of 132° E. longitude, to be waste scrub and desert. He published: *Geographical Travels in Central Australia* (M. I. Bourne), 1874; *The Journal of a Forgotten Expedition* (Adelaide), 1880; and *Australia Twice Traversed*, 1889.

Giles, St. (Lat. *Ægidius*), a high-born Athenian of holy life, who lived towards the close of the seventh century. His festival falls on Sept. 1. In the Middle Ages he was regarded as the special patron of lepers, beggars, and cripples, and his fame still survives in the names of some well-known churches. See Rembray's *St. Giles*, 1884.

Gilgal, the name given to several places which are mentioned in the O.T. as being in Palestine. One is mentioned in Josh. iv. 19, as being about 3 m. E. of Jericho. Another place of similar name was to be found in Mt. Ephraim, N. of Bethel,

and a third S.E. of Cæsarea, known as G. of the Goim. In Samaria there was another situated near Shechem, and a second near Jericho is mentioned as one of the sacred places in the time of Samuel.

Gilgit, or **Gilghit**, a British agency situated in the N.W. of Kashmir. It is the name both of a town and district, and includes Chitral G. and part of the Indus. It has been the centre of a British agency since 1889. The town is situated nearly 5000 ft. above sea-level. Area of dist. 30,000 sq. m.

Gill, (**Arthur**) **Eric Rowton**, English sculptor, b. Feb. 22, 1882, at Brighton; son of Rev. A. T. Gill, a minister of the Countess of Huntingdon's Connection, who afterwards entered the Anglican fold at Chichester. G. was educ. at the Preparatory School, Brighton; and, from 1897, at Chichester Art School. Pupil to Douglas Caroe, architect, 1889-1903; but preferred letter-carving, which led to sculpture in the strict etymological sense. He had become an agnostic; and, later, a socialist. In 1910 he began carving the human figure in stone; and he was encouraged by the approval of Augustus John and the patronage of Count Kessler. A belief that absolute truth must be ascertainable led him to join the Church of Rome in Feb. 1913. In the same year he was commissioned to execute the Stations of the Cross in Westminster Cathedral. After the Great War he carved *Christ Driving the Moneylenders out of the Temple* as a War Memorial, and it was placed at the main entrance to Leeds University. Though his carvings are sometimes exquisite (e.g. 'St. Sebastian,' 1919-20), they are often done in that over-conscious defiance of convention which was first made famous by Epstein.

Gill, **Sir David** (1843-1914), British astronomer; b. June 12; eldest son of David G. Blairrthan, Aberdeenshire. Educ. at Aberdeen; Marischal College and the University. Directed private observatory of Lord Lindsay, Dun Echt, 1873-6. Accompanied Lord Lindsay's expedition to Indian Ocean. Official astronomer, Cape of Good Hope, 1879-1906; improved observatories and did geodetic work in S. Africa. K.C.B. 1900. President British Association 1907-8. Died at Kensington, Jan. 24.

Gillespie, **George** (1613-48), a Scottish divine, b. at Kirkcaldy, and educated for the ministry at St. Andrews. On the completion of his education he was appointed minister to the parish of Wemyss (1638). At the General Assembly of that year at Glasgow he showed himself to be

a staunch and fearless upholder of the Scottish faith. He took part in the Westminster Assembly of 1643, and was one of the leaders of the debates there. In 1648, the year in which he died, he was moderator of the General Assembly. In 1646 he published a book called *Aaron's Rod Blossoming*. This laid down clearly the case for Presbyterian independence.

Gillespie, **Thomas** (1708-74), a Scottish divine, b. at Clearburn in Midlothian. He was educated at Edinburgh and Perth, and afterwards went to Northampton, where he was ordained. He was, however, received into the Presbyterian Church and became minister at Carnock, Fife. He was deposed by the General Assembly in 1752 for what they called contumacy. He still, however, after his deposition continued to preach in his former parish, where he had a large following. Attempts were made to get him reinstated but he refused to re-enter the church unless they altered their policy. Finally he formed the Relief Church, which was to relieve worshippers from the discipline of the church courts. This body finally amalgamated with the United Presbyterian Church. He published a *Practical Treatise on Temptation*, and *An Essay on the Continuation of Immediated Revelation in the Church*.

Gillette, **William Hooker**, American actor and playwright; b. July 24, 1855, at Hartford, Conn.; son of Francis G., U.S. senator. He began acting in 1877, and distinguished himself as Maurice Brachard in *Samson*. Amongst the plays he wrote are: *Held by the Enemy*; *Secret Service*; and *Sherlock Holmes*—adapted from Conan Doyle's stories about that detective hero, who was represented on the stage by G. himself until there was almost an identification of the two characters.

Gillies, **John** (1747-1836), an historian and scholar, b. at Brechin in Forfarshire, and educated at Glasgow University. He afterwards became tutor to the sons of the Earl of Hoptoun. He published during his lifetime a translation of *Isocrates* and *Lysias*, 1778; *History of Greece*, 1786; *Frederick II. of Prussia*, 1789. He was appointed royal historiographer for Scotland in 1793. Between the years 1807-10 appeared his *History of the World from Alexander to Augustus*.

Gillingham: (1) A municipal bor. of Kent, situated on the Medway, near the tn. of Chatham. The main industries of the town are brick and cement manufactures, whilst the town has also a large torpedo factory. Pop. 54,000. (2) A tn. of Dorsetshire,

a few miles N.W. of Shaftesbury. Pop. 3500.

Gillott, Joseph (1799-1873), a celebrated Eng. penmaker, *b.* at Sheffield. At an early age he settled in Birmingham, and set up there a factory for the manufacture of steel pens. To him belongs the credit for having perfected the steel pen. He made a large fortune out of his factories. He *d.* at Edgbaston.

Gillray, James (1757-1815), an Eng. caricaturist, *b.* at Chelsea, being the son of a trooper. He quickly became known as an engraver of some note, and before 1790 had established himself as one of the most successful of Eng. caricaturists. His caricatures were good-humoured and topical, being aimed principally at Napoleon and the Fr., and also at the leading politicians in England. In a broad way he caricatured the follies and vices of the day. Life by J. Wright, 1851. See CARICATURE.

Gills, or Branchiæ, the respiratory organs of aquatic animals, consist of delicate expansions of skin through which the oxygen is taken into the blood and carbonic acid emitted. Invertebrates generally respire through the skin, and their G. are merely slight expansions of the body-wall; many Echinodermata have their respiratory organs attached to their feet or tentacles, or connected with the thin filaments which float from the head; some of the lower crustaceans, *e.g.* Phyllopora and Branchiopoda, also breathe through their feet or through respiratory filaments, as in the case of the lobster. *Limulus*, the king-crab, is characterised by a series of broad, flat sacs called 'G. books,' which are borne on the abdominal appendages. The lamellibranchiate molluscs usually carry their G. in the form of ciliated plates on each side of the body. In fishes, the G. are generally composed of triangular, membranous folds of skin which are supported by the branchial arch and lie on each side of the gullet. G. are not found in any order higher than the amphibians and in certain cases, *e.g.* the frog, they are replaced by lungs in later life.

Gilly, a Belgian tn., situated in Hainault, just outside the town of Charleroi. There are important coal mines here. Chief industries are iron, glass, nail and oil works. Pop. 24,000.

Gillyflower, a term applied to several very different plants, but is most often used to indicate *Cheiranthus Cheiri*, the wallflower. *Dianthus caryophyllus*, the pink, and *Matthiola incana*, the stock, are also called by this name.

Gilman, Daniel Coit (1831-1908), an American educationist, *b.* at Norwich, Connecticut. He was educated at Yale, where he graduated in 1852. He afterwards visited Berlin, where he studied for some time, returning from here to Yale, where he became first assistant librarian, and later librarian. At the Sheffield Scientific School of Yale University he was also professor of political and physical geography. He had an almost revolutionary influence on American educational methods, and was on the governing board of the Sheffield Scientific School, and member of the School Board of Haven, and secretary to the Board of Education, Connecticut. In 1872 he became president of the University of California, and two years later he became the first president of the Johns Hopkins University. He occupied this post until 1901, when he became the president of the Carnegie Institution at Washington. This he held until 1904, and four years later he died. He was an Hon. LL.D. of practically every university in the U.S.A. Amongst his publications were: *University Problems in the U.S.*; *James Munroe*; *The Launching of a University*.

Gilman, Lawrence, American writer on music, etc.; *b.* July 5, 1878, at Flushing, N.Y.; son of Arthur C. Gilman. Studied painting under Wm. M. Chase, and illustration at Art Students' League, New York. On New York *Herald*, 1896-98; meanwhile teaching himself piano, organ, and composition. On *Harper's Weekly* from 1901; on editorial staff 1903-15. On *North American Review*, musical, dramatic, and literary critic, 1915-23. On *Herald-Tribune* since, as musical critic. Has written: *Phases of Modern Music*, 1904; *Aspects of Modern Opera*, 1908; *Nature in Music*, 1914; and several musicians' memoirs and guides.

Gilpin, Bernard (1517-83), known usually as the 'Apostle of the North,' *b.* at Kentmere Hall, Westmorland. He was educated at Queen's College, Oxford. After accepting a vicarage for a short time, he travelled in France, and studied at Louvain and Paris. On his return he was made Archdeacon of Durham. His fearlessness and outspokenness gained for him many enemies, but he was ultimately appointed rector of the parish of Houghton-le-Spring. He was offered the bishopric of Carlisle, but preferred to remain in his own parish. Here his influence for good was enormous, and he did much for education. He built and endowed a grammar school. He also spent much of his time in excursions into the

wilds of Cumberland and Northumberland, on what were called missionary journeys. He lifted his parish from a state of degradation to a more cultured position before his death.

Gilyaks, also spelt Gee-laks, Ghiliaks, an aboriginal race in Siberia. Their country extends from Tambovsk or Girin, some 350 m. S. of Nikolaevsk, to the coast near the mouth of the Amur, as well as over the N. half of the is. of Sakhalin. Réclus, who called them 'Giliaks' or 'Kilé,' holds the view that they were 'related to those mysterious Ainos who are the object of so much discussion among ethnologists.' Bethat as it may, much light was thrown on their curious superstitions and primitive habits by Henry Lansdell, the famous missionary, who journeyed through Siberia in 1878. Lansdell regarded the race as the most thoroughly heathen in Siberia and he indicated in his *Through Siberia* that though there was trade between Europeans and the G., very little was known of them. As a matter of fact they were a fast disappearing race even when Lansdell visited them. Women occupied a low position among the G., who, like the neighbouring Goldi, were, and probably are still, polygamists, and, according to Japanese records as quoted by Ravenstein, polyandry also prevailed. In stature these aborigines are diminutive, usually below rather than above 5 ft. Their skin is tawny, like the Chinese; hair black and not thick. They do not, or did not, cultivate the land, but subsisted entirely on fish. Their habits were said to be dirty beyond description, and they are said never to wash. Extremely superstitious, the G. believe in wooden idols and charms as antidotes to disease. Their idols are in the form of the tiger, bear, etc., which animals are closely connected with their superstition, if not their religion. The 'shamans' or priests, who might be male or female, were regarded as powerful mediators between the people and the evil spirits. (Consult also P. M. Collins, *Siberia to Japan*, 1860, and the same author's *A Voyage down the Amoor*, 1860.)

Gin, or **Geneva**, a spirit distilled from malt, or from unmalted barley or other grain, and afterwards rectified and flavoured very slightly with oil of turpentine or juniper. It contains from 40 to 50 per cent. of alcohol. Sweetened G. or Old Tom is made by adding the right proportion of sugar to the ordinary spirit. Hollands G., Schiedam, or schnapps is a variety made at and around Schiedam in Holland, from rye meal

and malt, and is flavoured with juniper berries. The word G. is a shortened form of Geneva, so called by confusion with the Swiss town, but is really a corruption of the Old Fr. *genreve*, meaning 'juniper,' from the Latin *juniperus*. G. is often adulterated with potato spirit, nutmeg, caraway, capsicums, etc.

Ginatilan, a tn. on the S.W. coast of Cebú, Philippine Is., 65 m. S.W. of Cebú. Cotton, tobacco, sugar-cane, rice, etc., are grown. Pop. 12,150.

Gindely, Anton (1829-92), an Austrian historian, b. in Prague, where he received his education. In 1862 he was appointed Professor of History at the university there, and not long afterwards archivist to the kingdom of Bohemia. He edited *Böhmische Landtagsverhandlungen von 1526, 1877-92*, and the *Monumenta Historiæ Bohemica*, 1864-7, and contributed articles to the *Abhandlungen*. His works include: *Geschichte des dreissigjährigen Krieges*, 1869-80; *Rudolf II. und seine Zeit*, 1862-5; and *Geschichte der Gegenreformation in Böhmen*, published 1894.

Ginger (*Zingiber*), an E. Indian plant belonging to the genus of Zingiberaceæ, which has been cultivated from the earliest times in the



GINGER

E. Indies. It grows in damp, moist places in various parts of tropical Africa, and is cultivated particularly in Jamaica, where many varieties are dealt in in commerce. The cultivation is quite simple. When the root-stock is taken up on the withering of

the stems, it is prepared for the market by scalding, or by scraping and washing; the first method yielding black G., the second white G. G. is put to many uses: medicinally as a stimulant and carminative, as a condiment or preserve, and sometimes, when green and mixed with other herbs, as a salad.

Ginkgo, the Japanese name for a genus of deciduous coniferous plants consisting of a single species, *G. biloba*, the maidenhair tree, which bears large, yellow, edible fruit and delicate foliage. The Japanese hold the tree as sacred and plant it round their temples.

Ginguéné, Pierre Louis (1748-1816), a Fr. man of letters, *b.* at Rennes in Brittany. He was educated at a Jesuit college there, and came to Paris in 1772, where he began writing critical articles for the *Mercur de France* and later on verses which brought him into prominence. In 1777 he composed a comic opera, entitled *Pomponni*. In 1791 he published *Lettres sur les Confessions de J. J. Rousseau*, in which he defended the life and principles of that author. He spread the principles of justice and liberty at the beginning of the Fr. Revolution in his paper, *La Feuille villageoise*, and this led to his imprisonment during the Terror; only escaping with his life on the downfall of Robespierre. G.'s ablest work is his *Histoire littéraire de l'Italie*.

Ginkell, Godart de, *see* **ATHLONE**, **EARL OF**.

Ginosa, in Italy, a com. of Naples, situated in the prov. of Otranto. Pop. 10,000.

Ginsburg, Christian David (1831-1914), a Hebrew scholar, *b.* at Warsaw. He was educated at the rabbinical college in his native city, and afterwards pursued the study of the Hebrew Scriptures, with special regard to the Megilloth, in England. His first translation was that of the *Song of Songs*, and this he followed up with a translation of *Ecclesiastes*. In 1870 Dr. G. was appointed a member of the committee for the revision of the Eng. version of the O.T. His *magnus opus* was the *Massorah*, published in three volumes. Of more recent date are his *Fac-similes of Manuscripts of the Hebrew Bible* and *The Text of the Hebrew Bible in Abbreviations* (1903). He also contributed many articles to the *Ency. Brit.*

Ginseng, or *Aralia quinquefolia*, a species of Araliaceæ, well-known on account of its doubtful medicinal properties. The root is used by the Chinese as a tonic and stimulant.

Gioberti, Vincenzo (1801-52), an

Italian philosopher, publicist, and statesman, *b.* in Turin. He was educated for the priesthood and ordained in 1825, and was subsequently appointed Professor of Theology in the university of his native city. Though living a rather retired life at first, G. soon began to take more interest in the political affairs of his country and in the literature of the day, the freedom of Italy gradually becoming the ruling motive of his life. In 1833, the period of rising political agitation, G., who was chaplain to the king, Charles Albert, was dismissed from court and imprisoned for four months on an accusation of promoting the Liberal movement. He then went to Paris and Brussels, at the latter city spending eleven years as tutor in an academy. During this time he wrote many works of philosophical importance, formulating his theory of Ortologism-Platonic idealism tinged with pantheism. *See* **Massari**, *Vita de V. Gioberti*, who has edited his entire writings.

Gioconda, La (Fr. *La Joconde*), the famous portrait of Mona (Madonna) Lisa, 'with the ineffable smile,' wife of Francesco del Giocondo (1468-1528), painted in Florence by his friend Leonardo da Vinci (c. 1502). It is said that he worked on it for four years, and even then considered it unfinished, surrounding her with all kinds of amusements to keep the divine smile upon her lips. The beautiful canvas was acquired by Francis I. for the Louvre. It was stolen from there in 1912 but subsequently recovered. There has naturally been many copies, and it was even claimed, but on insufficient evidence, that the Louvre treasure was not the original. Besides Vasari, Michelet, Th. Gautier, Gustave Planche, and George Sand wrote enthusiastically about the picture.

Giocondo, Fra Giovanni (1450-1515), an Italian architect, engineer, and antiquary, *b.* at Verona. He became a Franciscan friar and went to Rome to study archaeology, where he made a wonderful collection of over 2000 ant. inscriptions. He was the architect of King Ferdinand of Naples, and later of Charles VIII. of France. He is said to be the designer of the Hôtel Dieu, Pont Notre Dame, and Chambre de Comptes. G. was also learned in philosophy and classical literature, and wrote notes on Cæsar's *Commentaries*.

Gioja, Melchiorre (1767-1829), an Italian writer on philosophy and political economy, *b.* at Piacenza. He was educated for the priesthood and took orders, but renounced them in 1796 and went to Milan, where he was appointed by the Fr. gov. di-

rector of the statistical bureau. The arrival of Napoleon in Italy drew him into public life, and he advocated a republic under the dominion of the Fr. After the fall of Napoleon, however, he retired into private life, and did not hold office again. G. was one of the first investigators to apply statistics to questions of public morality and political economy. Philosophy itself was with him classification and consideration of ideas, and logic was regarded by him as a practical art. *Filosofia della statistica*, G.'s latest work, contains briefly his ideas on human life, and affords the best insight into his aims and methods. He also wrote *Del merito e delle recompense* and the *Nuovo prospetto delle scienze economiche*, which last may be considered the finest treatment of the division of labour since Adam Smith's *Wealth of Nations*.

Giolitti, Giovanni (1842-1928), an Italian statesman, b. at Mondovì in the prov. of Cuneo. He received his education at Turin, and after a rapid career in the financial administration, he was appointed Councillor of State and elected to parliament in 1882. He became Minister of the Treasury in 1889, and Minister of Finance in 1890, but he was soon compelled to resign this position on account of his policy of extreme economy. Two years later he became president of the ministry, and during his tenure of office succeeded in introducing many needed reforms in favour of the lower classes. In 1901 he was Minister of the Interior, and in 1906 Premier. Was pro-Ger. in the Great War and a pacifist. Italy having decided to join the Entente nations, G. was replaced in power by Baron Sonnino, and thereafter formulated a new programme of Socialism. In Aug. 1917 he was re-elected president of the provincial council of Cuneo, when he delivered a much-advertised speech praising the worth of the Italian soldier and propounding, as the principal object of the war, the abolition of future wars. In his paper, the *Stampa*, he laid down a vast plan of social, economic, and political reforms, including the abolition of secret diplomacy, and hinted that the one person capable of effecting a transformation of Italy on those lines was himself. He, however, never returned to power, and d. in July 1928. In the plenitude of his power he had been virtually dictator of Italy and was a statesman of undeniable abilities. His passion for economy in administration, however, was in marked contrast to the far bolder and more striking reforms of the present dictator of Italy.

Giordani, Pietro (1774-1848), an Italian author, b. at Piacenza. His writings are numerous, the most valuable being the collection of letters, *Epistolario*, published with the *Opere*. He also wrote various critical essays, political pamphlets, eulogies, and memorial addresses. In his youth, G. joined the Benedictine Order, but in 1808 he left it to become secretary of the Academy of Bologna. This office, however, he was obliged to give up in 1815 on account of his Liberal political views, and from that date till his death he continued to fight for the cause of liberty, being remembered as a great patriot as well as a noted writer. G. is considered as one of the greatest classical scholars of his day. See Romani, *Della vita e delle opere di Pietro Giordani*.



GIORGIONE DA CASTELFRANCO

Giordano, Luca (1632-1705), an Italian painter, b. in Naples. The first rudiments of drawing he acquired from his father, Antonio G., who was, however, an indifferent painter. He painted with great facility at a very early age, and at the age of thirteen he was placed under the instruction of Ribera. His father later took him to Rome, where he studied under Pietro da Cortona and copied many of the great master's pictures. He also visited Venice and studied the works of Paul Veronese and Titian. G. painted a great number of pictures, which may be seen in the chief galleries of Europe. One of the most famous is, 'Christ expelling the Traders from the

Temple' in the church of the Pedri Girolamini in Naples. Others of note are, 'The Judgment of Paris,' in Berlin, and 'Christ with the Doctors in the Temple,' in Rome.

Giorgio, Francesco (1439-1502), an Italian architect, sculptor, engineer, painter, and bronze-caster, *b.* at Siena. He is prominent among the artists of the Renaissance on account of his great versatility; but he principally devoted himself to engineering and military architecture, his services being constantly in demand by the Sienese republic. His principal authentic picture is that of the Madonna and Child enthroned in the church of Siena, though there are many others in the different galleries of Europe attributed to him.

Giorgione da Castelfranco (1477-1511), one of the chief Venetian painters of the High Renaissance, whose real name was Giorgio Barbarelli; Giorgione (Big George) being applied to him on account of his ability. He was *b.* at Castelfranco, but we have very meagre information as to the facts of his life. He appears to have been of humble origin, and was brought up at Venice, where he seems to have served his apprenticeship under Giovanni Bellini, and it was at Venice that he became famous. In 1500, at the early age of twenty-three, he was chosen to paint portraits of the Doge Agostino Barberigo and the condottiere Consalvo Ferrante. He decorated the façades of about half a dozen palaces in Venice, which have long since been defaced, the most important being that of the Fondaco dei Tedeschi (1508). All accounts of his life represent G. as being a person of great social charm, a musician, and a romantic and ardent lover; he is said indeed to have *d.* in consequence of a love affair. It has been said that G.'s position in Venetian arts was similar to that of Leonardo in Florentine art. Quite 150 paintings are attributed to him in the European galleries, but only a few are of undoubted authenticity, notably: 'Madonna enthroned between Saints Liberale and Francis,' in the cathedral of Castelfranco; 'La Famiglia di Giorgione,' in Venice; 'Three Eastern Sages,' in Vienna; 'The Three Ages of Man,' in Florence; and 'The Sleeping Venus,' in Dresden. G. *d.* at Venice at the zenith of his popularity. See Vasari, *Lives of the Painters*, etc.

Giotto (Tommaso di Stefano) (1267-1336), an Italian painter of the school of Giotto, surnamed G. because he imitated the manner of Giotto, his great predecessor. He decorated the Vatican Palace at Rome,

and he painted numerous frescoes and oil pictures, many of which are extant. The following are attributed to him: 'Deposition,' in the Uffizi; 'Crucifixion' and 'Adoration,' in the Strozzi Chapel at Santa Maria Novello; and the 'Legend of Constantine and Pope Sylvester,' at Santa Croce in Florence. See Vasari, *Lives of the Painters*, etc.

Giotto, Ambrogio di Bondone, an Italian painter, architect, and sculptor, *b.* in Florence, probably in 1266 or 1267. There are but few known facts about his life, but he was the son of a peasant landowner, it is generally agreed, who, though of no large possessions, was of reputable descent. From G.'s works it is evident that he was a pupil of the Rom. school, developing its early Christian and classic side. His earliest works are to be found in the church of St. Francis at Assisi. Here is his series of the 'Life of Christ' and the 'Allegories of St. Francis.' In 1298 G. painted



GIOTTO DI BONDONE

the altar-piece of St. Peter's at Rome and designed the 'Navicella' in mosaic—Christ saving St. Peter from the waves. This is still to be seen, though much restored and transformed, in the vestibule of St. Peter's. The series of frescoes with which G. decorated the walls of the chapel built in Padua in honour of the Virgin brings us to the greatest of his undestroyed enterprises. These frescoes were painted in 1303, and illustrate the 'Life of Christ' and the

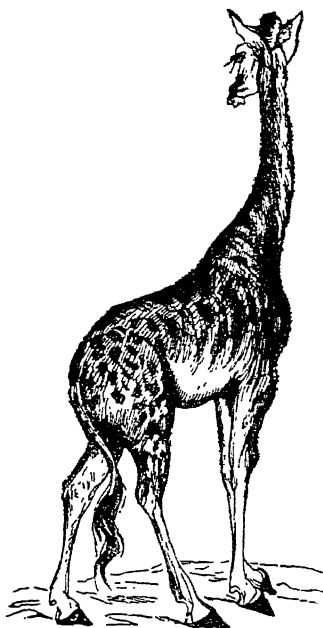
'Life of the Virgin' in thirty-eight scenes. In these G. reaches the height of his genius. G. next returned to Florence and Assisi, where he painted the four famous allegorical frescoes in the vault of the church: 'The Marriage of St. Francis with Poverty,' 'The Triumph of Charity,' 'The Triumph of Obedience,' and 'The Glorification of St. Francis.' Though perhaps hardly of the first rank. G. was an architect, and his masterpiece of design, the Campanile, known as Giotto's Tower, was begun in 1334, when he was made chief architect of the Florentine Cathedral. Though unfinished at his death, the Campanile was carried out according to G.'s plan in every detail. Its reliefs and statues are among the finest works of Italian Gothic sculpture. The art of painting, as re-created by G., was carried on by his pupils and successors throughout Italy, with but little change or development, for nearly a hundred years. G. d. in 1336. See Ghiberti, *Commentari*; and Vasari, *Lives of the Painters*.

Gippsland, in Australia, the S.E. district of Victoria, named after Sir George Gipps, governor of New S. Wales from 1838 to 1846. It has an area of nearly 14,000 sq. m., and though mountainous in the N.E., is of a more agricultural nature in the S.W., where farming and cattle-grazing are carried on. Its chief mineral wealth consists of gold, silver, copper, lead, coal, etc.

Gipsies, see GYPSIES.

Giraffe, also known as **Camelopard**, the tallest of all mammals. *Giraffa*, the Spanish name, is derived from the Arabic *zaraf*, whilst the classic term *camelopard* probably came into use when these animals were introduced into the Rom. amphitheatre from N. Africa. This name has now more or less fallen into disuse. The G. constitutes a distinct family of ruminants, containing one species only. It is a native of Africa, and is found S. of the Sahara, generally in herds of from five to forty. The chief characteristic of the animal is the enormous length of the neck and limbs, and the long, tufted tail. Its tongue is also remarkable for its great length, combined with elasticity and power. The head is furnished with two protuberances between the ears, commonly described as horns. The G. is an inoffensive animal and usually seeks safety by flight, not being easily overtaken even by a fleet horse. When fighting it kicks swiftly with its hind legs and can make a stout resistance, being capable of even keeping off a lion. Persecution has of late years much reduced the number of Gs. and led to their

extermination from many districts. Gs. were first brought to the Zoological Gardens in London in the year 1836, and since then many specimens have been acquired which have bred in the Gardens. The G., however, is rather a delicate animal, and needs care in captivity. These animals are essentially inhabitants of open country. Gs. are able to



GIRAFFE

browse on tall trees with the greatest of ease by reason of their long necks and flexible tongues, and they are capable of going for a long time without water and seldom feed on grass. In their native state in Africa, when standing among the mimosa-trees, they can often hardly be detected, as they harmonise so completely with their surroundings.

Giraldi, **Giglio Gregorio** (or **Lilius Gregorius**) (1479-1552), Italian poet and archæologist; b. June 13, at Ferrara; whence, having finished his studies, he removed to Naples—where Pontano, Sannazzaro and other poets became his friends.

But poverty compelled him to seek a patron elsewhere—with the Pico princes of Gardi and Mirandola. In 1507–8 he was at Milan, studying Gk. Thence he went to Modena, and became tutor to a son of Count Nicole Rangone—Ercole, afterwards cardinal. He went with his pupil to Rome, and became protonotary apostolic. His library was destroyed in the sack of Rome, 1527; and, soon afterwards, his protector Cardinal Rangone died. He returned to Mirandola; but the prince there was assassinated, 1533, and G. lost his refuge. He was much disabled by gout during his last years in Ferrara; where he *d.*, Feb. 1552. He was an elegant Latin poet, and systematised classical mythology.

Giraldi, Giovanni Battista (1504–73), Italian author; *b.* Nov. at Ferrara; son of Christoforo G. Became Professor of Medicine and Philosophy at the University of Ferrara, 1525. Obtained chair of belles-lettres, in succession to Celio Calcagnini, 1537. About 1542, became Secretary of State under Ercole d'Este II.; was continued in that employ under Alfonso II. As a member of the Accademia delle Affidati, he took the surname of Cinzio and is commonly known by this assumed name, which, Anglicised, is Cinthio. Wrote nine tragedies—e.g., *Il Orbecche*, 1541. *Gli Hecatommithi* (or 'A Hundred Novels'), 1565, is a famous volume of tales. Shakespeare borrowed from this source his plots in *Measure for Measure* and *Othello*, though, in the latter play, he profoundly modified the relations of Othello and Iago and introduced two new characters in Roderigo and Emilia. *G. d.* at Ferrara, Dec. 30.

Giraldus Cambrensis (c. 1146–c. 1220), a mediæval historian and ecclesiastic, also called Gerald de Barri, of Eng. descent. Under the influence of his uncle, Bishop of St. Davids, he took holy orders about 1172, and soon afterwards became Archdeacon of Brecknock. This position he filled for four years, and then retired to the University of Paris, where he resumed the study of law and theology. In 1184 he returned to England, was made one of the king's chaplains, and accompanied Prince John on his voyage to Ireland. See *Itinerary* (Everyman's Library).

Girard College, a college for the education of orphans opened at Philadelphia, 1848. It was built with moneys left by Stephen Girard. It is non-sectarian.

Girard, Stephen (1750–1831), American banker and philanthropist, *b.* near Bordeaux. He *d.* at Phila-

delphia, and left by his will money for the foundation of Girard College.

Girardin, Emile de (1806–81), a Fr. politician, journalist, and legislator, the illegitimate son of Alexandre, Comte de G. (*d.* 1855). He was educated in Paris, bore the name Delamothe till 1827, and was acknowledged by his father in 1847. His first literary production was the novel *Emile* (1827). After the revolution of 1830 he established *Le Journal des Connaissances Utiles*, 1831; *Le Musée des Familles*, 1833; *Le Panthéon littéraire*, 1835 (issued at one franc each). *La Mode*, founded in 1829, was very successful. He was elected to the Chamber of Deputies, 1834. His idea of a halfpenny newspaper was carried out in 1836, when he founded the *Presse*, a journal of Conservative and Royalist tendencies. Attacks on this led to the quarrel and duel in which G. killed A. Carrel, editor of the *National*. Till the revolution of 1848, G. was occupied with politics, gradually becoming a decided Republican. He helped the election of Louis Napoleon to the presidency, but disapproved of the *coup d'état* (1851), for which he was exiled for a time. In 1866 he finally left the *Presse* to direct the *Liberté*, in which he wrote vehemently against Prussia and voted for war (1870). This was followed by: *L'Union française*, 1871; *Journal officiel*, and *La France*, 1874. In this and the *Petit Journal*, G. supported the republic. He retired in 1881. His works (apart from journalism) include: *La Fille du Millionnaire* (comedy), 1858; *Le Supplice d'une Femme* (with Dumas fils), 1865; *De la Presse périodique au XIX^e Siècle*, 1837; *De la Liberté de la Presse et du Journalisme*, 1842. His first wife was Delphine Gay (1804–55), who wrote 'Lettres parisiennes,' under the pseudonym 'Vicomte de Launay,' in the *Presse* (1836–47). See *Collected Works* (6 vols.), 1860–1; d'Heilly, *Mme. de Girardin*, 1868; Saint-Amand, *Mme. de Girardin*, 1874.

Girardon, François (1628–1715), a Fr. sculptor, sent by Séguier first to Anguier's studio and then to Rome. On his return he obtained a position at court, decorating the palaces at Versailles and Trianon under Lebrun's direction. Admitted to the Academy of Painting and Sculpture in 1657, he became professor in 1659. Chief among his works is 'Tombeau de Richelieu' at the Sorbonne. Others are the white marble medallion of Louis XIV., presented to his native Troyes, 1690; equestrian statue of Louis XIV. in the Place Vendôme, 1699; 'L'Hiver'

and 'L'Enlèvement de Proserpine' at Versailles. G. was a friend of Condé, Boileau, Racine, and La Fontaine. He married Catherine Duchemin (d. 1698).

Giraud, Count Giovanni (1776-1834), an Italian comic writer of Fr. descent. His first work, *L'onesta non si vinca*, appeared in 1798. He wrote also comedies (4 vols., 1808), somewhat resembling Goldoni's, the most popular being *L'ajo nell' Imbarazzo* (*Le Précepteur dans l'embarras*, 1807). His *Teatro domestico*, 1816-25, was a collection of plays for children, partly in imitation of Berquin's works (1749-91). He raised a squadron of cavalry (c. 1798) to defend Pope Pius VI. against the Fr. G. became director of all the theatres in Italy (1813-35), but ruined himself by speculation. See *Nouvelle Biographie Générale*; Tiplado, *Biografia degli Italiani illustri*; Bettinger's translation of Giraud and Nota, 1839.

Girder, a beam of metal or wood intended to be supported at either end and to carry a vertical load between the ends. A G. spans the distance from wall to wall and supports a superstructure, such as the pathway of a bridge, a floor, etc. Gs. either extend over one or more intermediate supports, or are supported only at the two ends. In the latter case, they are called simple Gs.; in the former, continuous. The upper and lower flanges of a G. are connected by a solid web, or by an open framework of diagonal and vertical members. Gs. naturally differ according to the purpose for which they are required. A sandwich G. is one which is composed of two wooden beams, with an iron flitch plate between, all bolted together. Again, a box G. is one in which the flanges are connected by two web plates, so that a cross section of the G. is box-like in form. Gs. are mainly used in connection with bridges (commonly being of steel, which has almost entirely replaced cast iron and wrought iron), of which they form the principal component parts, and they are employed generally to form the horizontal weight-bearing members in steel and iron structures of every kind. G. bridges are generally used for short spans, seldom exceeding 100 ft. In plate-G. bridges the Gs. have solid webs composed of steel plates, and of recent years longer Gs. have come to be constructed. The longest ones are those of the viaduct on the Riverside Drive in New York, erected in 1900, the span being 126 ft. A more extensive adoption of plate-Gs., together with new designs and details, has arisen in consequence of the large amount of new construc-

tion and corresponding increase in the weight of rolling-stock in recent years.

Girgeh, Girga, or Jirjeh, a prov. and tn. of Upper Egypt. Area about 575 sq. m. Cap. of prov., Suhag. Pop. 800,000. The town is on the Nile's l. b., and on the railway from Cairo to Assouan, 60 m. from the ruins of Thebes. It is the seat of a Coptic bishop, has a Latin monastery, and a government cotton factory. Most of the inhabitants are Christians. Pop. 20,000.

Girgenti: (1) Prov. of Sicily, on S.W. coast. It is hilly, but produces cereals, fruits, olive-oil, sulphur, salt and fish. Area 1172 sq. m. Pop. 428,000. (2) The cap. of above and episcopal see, on an eminence overlooking the sea near the site of ancient Agrigentum, on S. coast about 60 m. from Palermo. Porto Empedocle, its port, is protected by a mole built on the ruins of an ancient temple. Officially the port includes Licata and Siculiana, and these are the chief towns in Italy for exporting sulphur. Remains of Agrigentum (fl. 560-406 B.C.) are to the E. of the modern town. There are interesting mediæval buildings, gates, and churches, notably the cathedral (fourteenth century). The library was founded by Bishop Lucchesi, 1765. The Saracens took G. from the Greeks, 828, and in 1086 Roger I. took it from them and founded a bishopric. Pop. 30,000.

Girl Guides. This movement was founded in 1910 by Lord Baden-Powell and his sister as a parallel organisation with the Boy Scouts; incorporated in 1915, and granted a Royal Charter by the King in 1923. The President is Princess Mary, and the Chief Guide is Lady Baden-Powell. Children from the age of eight to eleven may join the junior branch, the Brownies; from eleven to sixteen they are known as Girl Guides; and those who elect to remain after that age are known as Guiders and Rangers. Princess Mary laid the foundation stone of the new building in Buckingham Palace Road on May 23, 1930, these headquarters being estimated to cost over £74,500. The movement seeks to develop the best instincts of citizenship in its members, to train girls to be of service to others, self-reliant, loyal to their King, country, and parents, honourable, courteous, obedient, cheerful in adversity, kind to the dumb creation, thrifty, pure in thought, word and deed. The Guide Law is based on the ten laws of chivalry used by knights of old, and all Guides must promise to do their best to observe the law. Badges are given for a vast number of activities in which Guides have

proved themselves proficient, from ambulance work and life-saving to cookery, needlework, and poultry-farming. In 1930 the numbers of the Girl Guides in the British Isles amounted to 519,000, while there were 106,000 in Overseas Dominions and the Colonies, and 269,000 in foreign lands—making a total of 895,000 in all. In America the Girl Scouts form a similar organisation, but the minimum age in this is ten, while seventeen is the maximum age of girls in a Patrol.

Girnár, a sacred mountain in the feudatory state of Palitana, India. S.W. of the peninsula of Kathiawar. 230 m. from Bombay. There are several Jain temples, and at the base valleys, gorges, and slopes covered with jungle. Altitude 3500 ft.

Girodet-Trioson, **Anne Louis Girodet de Roussy** (c. 1767–1824), a French painter, pupil of Luquin and David. He won the Grand Prix de Rome with 'Joseph vendu par ses frères,' 1789. He travelled in Italy and France, and was awarded the Légion d'Honneur, 1816. His works include: 'Danaë,' 1798; 'The Seasons,' 1799; 'Ossian and his Warriors,' 'Scène du Déluge' 1806; 'Sommeil d'Endymion,' 1792; 'L'Inhumation d'Atala,' 1808 (both in Louvre); 'Portrait of Napoleon I.'; 'Aurora,' 1806 (Leipzig Museum). See *Œuvres posthumes* (published by Coupin), 1829; Blanc, *École française*; Meyer, *Gesch.*; Gautier, *Guide du Louvre*.

Gironde, a maritime dept. of S.W. France, near the Gironde estuary formed by the confluence of the Garonne and Dordogne, bordering the Bay of Biscay. It comprises part of ancient Guienne, is fertile in the E., but belongs to the region of the Landes on W. coast, being separated from the sea by sand dunes, 35 to 300 ft. high, extending for 75 m. The district is particularly famous for wine (especially claret). The two chief districts are 'région girondine' above Bordeaux, and Médoc below Bordeaux. The three great vineyards are Château-Margaux, Château-Lafitte, and Château-Latour. Turpentine, pitch, and charcoal are obtained from the pine plantations on the coast ('landaise'). Grain, vegetables, fruit, salt, sugar, tobacco, candles, etc., are produced. There are six arrondissements: Bordeaux (capital), Bazas, Blaye, Lesparre, Libourne, and Réole. Area about 4140 sq. m. Pop. 830,000.

Girondists (Fr. *Girondins*), the moderate Republican party amongst the great political parties of the French Revolution, which played a distinguished part in the Legislative Assembly (1791–2), and the Con-

vention. The department of Gironde sent up as its representatives the earliest leaders of this party, hence the name. In the legislative assembly the G. held the most commanding position, being the leaders of the progressive or revolutionary party, and they were distinguished by such men as Vergniaud, Gaudet, Isnard, and Brissot, the last named, though perhaps not so distinguished an orator as his co-workers, being a noted statesman. Early in 1792, Louis XVI. was obliged to form a



VERGNIAUD, THE GIRONDIST

G. ministry with Roland and Dumouriez as its chiefs. It was, however, short-lived, and on its close dissensions broke out between the G. and the more extreme members of the assembly. After the National Convention, the G. tried to save the king's life, but were unsuccessful, and the last effort of the party was an ineffectual attempt to impeach Marat, who, however, overthrew and arrested many of their number. From 1793 may be dated the fall of the G.

Girouard, Désiré (1836–1911), Canadian judge and legal writer; b. July 7, at St. Timothée, P.Q.; graduated from McGill University; practised at the Montreal Bar, 1860–95. He was a member of the Dominion parliament for J. Cartier, 1878–95; carrying the Deceased Wife's Sister Bill, 1882. Judge of the Supreme Court of Canada from 1895. He became Deputy Governor-General of Canada, 1910. One of the founders of the *Revue Critique*. His publications include: *Lake St. Louis, Old and New*, and *La Salle*, 1893; *Laws of Marriage*; *Treaty of Washington*;

The Pacific Scandal. Died as result of an accident, March 22.

Girtin, Thomas (1775–1802), an English painter and etcher. He was apprenticed to a mezzotint engraver and soon established a reputation by his engravings. He practically established, however, the modern school of water-colour painters. From 1794 to his death he exhibited at the Academy.

Girton, a par. and vil. in the co. of Cambridge, situated about 2 m. W. of the town of that name. One of the famous colleges for the higher education of women is situated here. It was moved to G. from Hitchin in 1872. There are about 200 students there now, and these are admitted to the lectures of the university as well as to their own college lectures. The fees are £50 per term.

Girvan, a tn. and par. of Ayrshire, Scotland, about 20 m. from the co. tn. of Ayr. It is a well-known health resort, and is noted also for its herring fisheries. Pop. 7000.

Gisborne, a tn. in New Zealand, situated in Poverty Bay in the North Is. Captain Cook landed at this place in 1769. Petroleum has been discovered in the neighbourhood. Pop. 14,000.

Gisors, a French tn., dept. Eure, situated some 30 m. E.S.E. of Rouen; it was originally a Norman town of some importance. The castle there was partly built by Henry II. of England, and the town still retains many fine old buildings. It manufactures, nowadays, lace, linen, and leather. Pop. about 5000.

Gissing, George Robert (1857–1903), an English novelist and miscellaneous writer b. at Wakefield, Yorkshire; studied at Owens College, Manchester. Of a curiously 'unpractical' temperament, he led a chequered and usually unhappy career. Beginning as a clerk in Liverpool, he next went to America, returning to Europe in 1877 to study at Jena. He returned to England in 1878 and eked out the livelihood gained from his novels by taking pupils. About 1886 he took a long-projected tour to Rome and Greece. He had made an unhappy marriage in America, and his first wife being dead, he married again, equally unhappily, in 1890. In 1897 he again visited Italy, with H. G. Wells, and in 1901 was obliged by his health to settle in the S. of France, where he died. His work is marked by sombre power. Most of his novels deal realistically with suburban life, and certainly portray more of the sordid than the joyous aspects of existence. They are, nevertheless, inspired by a deeply moral ideal. His works include: *Workers in the Dawn*, 1880 (showing the results of

his study in Germany); *The Unclassed*, 1884 (new ed. 1895); *Isabel Clarendon*, 1886; *Demos*, 1886, and *Thyrza*, 1887 (all written from the point of view of a social outlaw); *A Life's Morning*, 1888 (his most cheerful novel); *The Nether World*, 1889 (a gloomy description of semi-starvation); *The Emancipated*, 1890; *New Grub Street*, 1891 (a study of the effects of want on literary powers); *Born in Exile*, 1892 (an introspective semi-autobiography); *Denzil Quarrier*, 1892 (new ed. 1907); *The Odd Women*, 1892–93 (new ed. 1907); *In the Year of Jubilee*, 1894; *Eve's Ransom*, 1895; *The Whirlpool*, 1897; *Human Odds and Ends*, 1897; *Charles Dickens: a Critical Essay*, 1898; *The Town Traveller*, 1898; *The Crown of Life*, 1899; *Our Friend the Charlatan*, 1901; *By the Ionian Sea*, 1901; *The Private Papers of Henry Ryecroft*, 1903 (largely autobiographical); *Will Warburton*, published in 1903; and the unfinished *Ieranilda*. See *Life* by Swinerton, 1913.

Giugliano, an Italian tn. in Campania, 6 m. to the N.W. of Naples. Pop. 17,000.

Giuliani, Giambattista (1818–84), an Italian philologist, b. near Asti in Piedmont, and devoted the greater part of his life to Dante. He became professor of moral philosophy at Genoa, and ultimately succeeded to the chair of rhetoric in the same town. He removed later to Florence. His chief works are: *Le Norme di Commentare la Divina Commedia*, 1856, and *La Vita Nuova e il Canzoniere di Dante*, 1863.

Giulio Romano (Giulio Pippi de' Giannuzzi) (1492–1546), an Italian painter and architect, b. at Rome; studied under Raphael, assisting him in several works, including 'Benefactors of the Church,' in the *Incendio del Borgo*, and the 'Apparition of the Cross,' in the Vatican. This last was one of a series in the Hall of Constantine, with the completion of which he was entrusted on Raphael's death. He succeeded Raphael as head of the Roman school of painting. Among his early architectural works is the Villa Madama, with its fresco of Polyphemus. In 1524 Federigo Gonzaga, Duke of Mantua, invited him to undertake numerous renovations and decorations in that city. Here he drained the marshes and made provision against periodic floods; restored the palazzo del Te, the cathedral, a ducal palace at Marmirolo and numerous minor buildings, and did much pictorial work, including the 'History of Troy,' 'Psyche,' 'Icarus,' and 'The Titans.' Later he designed the façade to the church of St. Petronio at

Bologna. Among his other works as a painter are 'The Martyrdom of St. Stephen' (Genoa), 'Holy Family' (Dresden), 'Mary and Jesus' (Louvre, Paris), and 'Madonna della Gatta' (Naples). His style is distinguished by freedom and animation. See his *Life* by D'Arco, 1842, and Vasari's *Lives of the Painters* (English translation by Foster, 1850).

Giurgevo, or **Giurgiu**, a tn. of Rumania in Wallachia, on the l. b. of the Danube, opposite Rustchuk, 40 m. S.W. of Bucharest. The town was founded by the Genoese in the fourteenth century, was destroyed by the Russians in 1829 and recaptured by the Turks in 1854. It has a large trade in petroleum, salt, and grain, and is the headquarters of commerce between Rumania and Bulgaria. There are also large saw-mills. Pop. 24,000.

Giusti, Giuseppe (1809-50), an Italian satirical poet, b. near Florence, and early began a brilliant series of poems denouncing the enemies of Italy and her own internal vices. In 1848 he became a member of the Tuscan Chamber of Deputies. Among his friends were Capponi, Manzoni, and D'Azeglio. He was actively sympathetic with the Liberation movement, but his temperament inclined him to moderate liberalism, and he was considered by some of his countrymen, e.g. the 'Young Italy' party, to be a reactionary. His poems include *La Ghigliottiera* (The Guillotine), written while he was still a student; *Il Dies Irae*, 1835, on the death of the Emperor Francis I.; *Lo Stirale*, 1836; *Il Brindisi di Girella*, 1840; *Gli Umanitari*; *Il Papato di Prete Pero*; *Gingillino*; and *Sant' Ambrogio*, 1846. See monographs by Fioretto (1871), Leonardis (1887), and Susan Horner (1864).

Givenchy (or **Givenchy-lez-La Bassée**), a vil., Pas-de-Calais, France, 2 m. W. of La Bassée, which was the scene of severe fighting in the Great War. In the B. of the Lys (q.v.), April 1918, the G. sector was the key to the whole situation on the S. front of the Ger. attack, and the position there had become especially critical by reason of the withdrawal of the Portuguese from the battle, thereby leaving the 55th British Division unsupported. This famous div. actually held an organised line of 11,000 yards, and this successful defence undoubtedly saved Bethune. Earlier in the War, G. was occupied by Indian troops, who were heavily attacked by the Gers. in Dec. 1914. There was also fighting at G. in 1915 during the Battle of Loos (q.v.). (George A. B. Dewar, *Sir Douglas Haig's Command*, 1922.)

Givet, a town of France, in the Ardennes, it stands on the Meuse and the Canal de l'Est. 40 m. N.E. of Mézières, and near the Belgian frontier. It is a busy manufacturing and trading centre with metallurgical and other factories. There are blue marble quarries near by. An old citadel, built by Charles V. on a height above the town, is the only remnant of its ancient fortifications. Pop. 7,100.

Givors, a French tn., dept. of the Rhone, situated 14 m. S.W. of Lyons on the r. b. of the Rhone. It manufactures iron, bottles, and glass, and is also a centre of the coal-mining industry. Pop. 14,000.

Gizeh: (1) a prov. of Upper Egypt. Area about 400 sq. m., with a pop. of 460,000. (2) A tn., situated on the l. b. of the Nile, some 3 m. S. of Cairo. It is near the Pyramids, which are about 5 m. to the W. The Sphinx and the ruins of Memphis are also in the immediate neighbourhood. An electric railway runs to both of these and also to the Pyramids. The Egyptological Museum which used to be here is now removed to Cairo. The Nile is crossed at this point by a bridge. Pop. 11,000.

Gjellerup, Karl Adolf (1857-1919), Danish author, b. at Roholte Zealand. His works are varied; including poetry, fiction, dramas (in which he was least successful), and criticism. Among them are: *En Idealist*, 1879, written under the pseudonym of 'Epigonos'; *Dei Unge Denmark*, 1880; *Germanernes Læring*, 1882—all three novels; *Rødjörn*, 1882, a collection of poems showing his radical tendencies; *Aander og Tider*, 1882, addressed to Darwin; *Brynhild*, 1884, a tragedy; *Vandreaaret*, 1885, a series of reflections; four dramas, viz: *Saint Just*, 1886; *Thamigris*, 1887; *En Arkadish Legende*, 1887; *Hagbad og Signe*, 1888; *Romulus*, 1889, a novel; *Richard Wagner i hans Høvedværk Nibelungens Ring*, 1890; *Herman Vandel*, 1891, a tragedy; and *Minna*, 1898, a novel. He gained a Nobel Prize, 1916-17.

Glaber, Raoul or Rodolphe (d. 1050), a French historian and monk of Cluny, b. at Auxerre. His *Historia*, in five books, extending from 900 to 1046, was first published by P. Pithou in 1596.

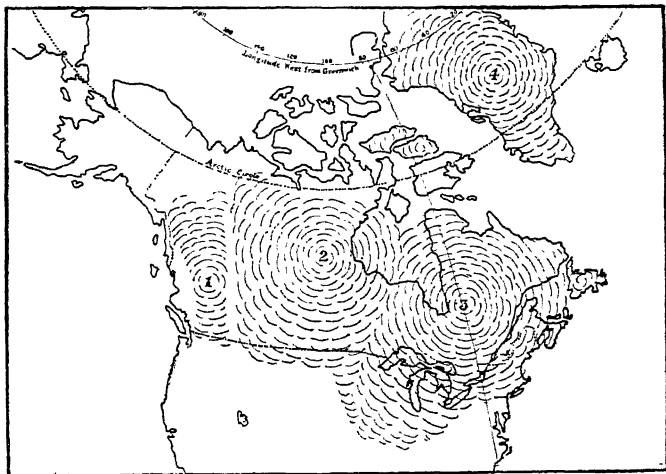
Glabrio, Acilius, see **ACILIUS GLABRIO**.

Glace Bay, a seaport of Cape Breton Is., situated on the N.E. coast of Nova Scotia. The centre of an iron and coal-mining district, with a pop. of 17,000. A Marconi wireless station for the sending of Transatlantic messages has been erected here.

Glacial, or Pleistocene, Period (Gk. *πλειστός*, most, and *καινός*, new), or **Ice Age**, the names usually given in geology to the latest division of time immediately preceding historic times and following upon the Neocene period. The terms Earlier Post-tertiary or Quaternary era are also used with the same meaning. 'Glacial period' and 'Pleistocene period' are practically synonymous as regards northern and temperate regions, the former referring rather to the climatic characteristics of the age, the latter to its form of life. The chief pecu-

(started by Lyell), and the 'ice-sheet hypothesis.'

An enormous mass of ice covered Canada and North-Eastern U.S.A., reaching E. to the Atlantic, and S. even below the region of the Great Lakes and New York. The White Mts., Catskills, and Adirondacks, as well as the Rockies on the W. and the Sierra Nevadas, all show signs of former glacial activity, while the glaciers of Alaska and British Columbia were so vast as to form almost a single continuous field. In the Old World the ice-sheet spread from



GLACIAL MAP OF NORTH AMERICA

- | | |
|---------------------------------|-------------------------------|
| 1. Centre of Cordilleran Sheet. | 3. Centre of Labrador Sheet. |
| 2. Centre of Keewatin Sheet. | 4. Centre of Greenland Sheet. |

liarity of the time was the marked fall of temperature, and the glacial conditions of Northern Europe and America were similar to those of the polar regions of the present day. Great mountain-glaciers and ice-fields appear to have formed and gradually advanced southwards, filling the river and lake basins, and submerging mountains and lowlands alike. Many geologists believe in several great submergences during the Glacial period. Only in the nineteenth century was much attention given to the subject. The three chief stages in our knowledge of glacial formations and causes are sometimes known as the 'diluvial hypothesis,' the 'drift hypothesis'

Scandinavia to N. Germany, blocking up the Baltic Sea, and northward to Great Britain, across the North Sea, finally reaching to Ireland and the Atlantic. Rocks found in the fen district and off Flamborough Head remain as proof of the spread of the ice to the British Isles from Norway before its final melting. The thickness of the sheet has been estimated at some 5000 ft. On the Continent the area covered was about 800,000 sq. m., several times larger than the Greenland ice-cap. Small glaciers and snow-fields extended as far S. as the Carpathians and Alps, and to the ranges and Central Plateau of France. The general tendency of all these ice-masses was to move downwards, and

from the Scottish Highlands they diverged in both directions, W. and E., to the Outer Hebrides from Ross and Inverness, and to the North Sea from Moray and Aberdeen. The flow eastward was checked by the great Scandinavian sheet, which pressed upon the Yorkshire coast and finally forced the Scottish ice N.W. to the Atlantic by way of Caithness and the Orkneys. Part of it also flowed down the Clyde valley, reaching N. Ireland, S. Wales, and the English Midlands, where boulders of Ailsa Craig granite have been found. The present Alpine glaciers are merely humble remains of the mighty ice-sheet which once covered all Switzerland. The former existence of glaciers is proved partly by certain deposits and partly by the peculiar character and formation of the surrounding country. The deposits consist of morainic materials, erratics, marine, fresh-water, and terrestrial accumulations, the most important substance being boulder-clay or 'till.' This is an unstratified clay, full of ice-worn stones and boulders, supposed to have been formed under glacier-ice. There are often several distinct layers of boulder-clay, separated by 'interglacial beds.' The lowest and oldest layer covers a vast area, extending S. to the Bristol Channel and Thames valley in England, and to the foot of the Harz Mts. in Germany. Similar deposits are met with in Switzerland and the Alpine regions, the Apennines, the Corsican Mts., the Spanish Sierras, the Pyrenees, the mountain ranges of France and Germany, and the Carpathians. The rock-surfaces beneath are smoothed and striated, or scratched and crushed. Other characteristic deposits are erratics, askers, or kames, Giants' Kettles, and clays with Arctic marine shells (especially in Scotland and Prussia). There are numerous lakes in glaciated regions, the streams have exceedingly irregular courses, and relatively there is little continuity of slope. Many of the lakes of Northern Europe and America originated in the Glacial period, and those of pre-glacial origin were considerably expanded. Lake basins were scooped out by erosion, and the ice-sheet by obstructing valleys in its retreat formed temporary lakes. One such temporary basin spread from N. Minnesota and N. Dakota far into Canada. The lochs of Scotland and the fiords of Norway were very probably largely produced by the erosive action of ice. The soil of glaciated regions is not derived from the disintegration and decomposition of the rock below, but from material or 'drift' carried down from elsewhere. This, unlike alluvium, has

some boulders of great size, and its materials are not generally rounded and sorted, but rather of rough, uneven surface, with numerous knolls and undrained hollows. Evidence of former glacial conditions has been found also in the Caucasus, Asia Minor, India (Asia Proper), parts of Africa and S. America, and in New Zealand.

The changes of climate during the Glacial period were accompanied by migrations of the fauna and flora of the Arctic and temperate zones. As the temperature fell, animals and plants moved from the polar to the tropical regions, returning poleward again with the rise of temperature, or seeking refuge on the mountain tops. Thus the climatic changes saw a series of corresponding variations of life-forms in the different regions.

Terminal moraines (1200 to 2000 ft. high) of glaciers are to be seen in a great amphitheatre round Ivrea on the Piedmont plains. The plains of France, Italy, Spain, S. Russia, and England S. of the Thames were not covered by any entire ice-sheet, but were frost-bound during a great part of the year. A detailed study of glacial deposits tends to show that the ice must have advanced and retreated again more than once. The exact number and extent of these fluctuations is still a matter for discussion, and different views are held. Some geologists believe in as many as five epochs of glaciation with four interglacial intervals, others only in one.

The true causes of the cold climate of the Ice Age are still much discussed, and many different theories are held. These can only be mentioned briefly here. Some believe it to have been the result of astronomical changes (James Croll, and Prof. Ball among others); others of terrestrial changes. Another theory ascribes it to variations in the quantity of heat radiated by the sun, supposing the latter to be a variable star. Changes of level of land and sea, perhaps accompanied by a diversion of the Gulf Stream across the isthmus of Central America to the Pacific or by submergence of the Panama isthmus, have also been suggested. One widely spread explanation is based on the relative positions of the earth and the sun at distant periods of time. The eccentricity of the earth's orbit is subject to gradual and irregular variations. With a maximum of eccentricity the earth is 14,000,000 m. nearer the sun during perihelion than in aphelion, the difference in the amount of heat received from the sun being about one-fifth.

For detailed study of the subject consult J. Geikie, *The Great Ice Age* . . . (3rd ed.), 1904; *Earth Sculpture*, 1898; Wright, *The Ice Age in N. America* (4th ed.), 1905; *Man and the Glacial Period*, 1892; Bonney, *Icework, Past and Present*, 1896; Penck and Brückner, *Die Alpen im Eiszeitalter*, 1901-6; Heim and Penck, *On the District of the Ancient Glaciers of the Isar and Linth*, 1886; Lyell, *Geological Evidences of the Antiquity of Man* (4th ed.), 1873; Geinitz, *Die Eiszeit*, 1906; Croll, *Climate and Time*, 1885; Herrmann, *Glacierscheinungen in der geologischen Vergangenheit*, 1896; Lewis, *Papers and Notes on the Glacial Geology of Great Britain and Ireland*,

lowes of mountains where perpetual snow accumulates; it moves slowly from higher to lower levels, making its way down towards the lower valleys, where it gradually melts. Not infrequently G. reach the borders of cultivation and have been known even to sweep away villages in their course. A G. moves at the rate of 18 to 24 in. in a space of twenty-four hours. It is steep and inaccessible at its lower end, but the middle part of its course is more level, though it becomes steeper again towards its source. The ice of which G. are composed differs from that produced by the freezing of still water, being composed of numerous thin layers, more brittle and less transparent than ordinary ice. A G.



TERMINAL MORAINÉ, MAIN GLACIER, MOUNT ROBSON, B.C.

1894; Dawkins, *Early Man in Britain*, 1880; Sir R. Ball, *The Cause of the Ice Age* (2nd ed.), 1892; Smith, *The Stone Ages in N. Britain and Ireland*, 1909; Chamberlin, 'Hypotheses as to the Cause of the Glacial Period' (*American Geologist*, vol. viii.), 1891; Wright and Chamberlin in *The American Journal of Science*, 1892-93; Howorth, *The Glacial Nightmare and the Flood* (i., ii.), 1893; *The Mammoth and the Flood*, 1887; *Ice and Water* (i., ii.), 1905; Gugenhan, *Die Ergletscherung der Erde von Pol zu Pol*, 1906. See also writings of Scheuchzer, Kuhn, de Saussure, von Charpentier, Agassiz, Ramsay. For further references to literature, see A. Geikie's *Textbook of Geology*, ii. (4th ed.), 1903; Chamberlin and Salisbury, *Geology* (iii.), 1906. See GEOLOGY and GLACIERS.

Glaciers (Fr. *glacier*; Ger. *gletscher*), the name given to rivers of snow compacted by pressure into ice. This mass of ice has its origin in the hol-

usually descends into a valley, far below the limit of perpetual snow, and ends amidst a wilderness of stones borne down upon its surface, the earthy, rocky rubbish being termed a 'moraine.' In tropical and temperate climates, G. are found only upon the higher parts of lofty mountains, but at the poles, great islands and whole continents are partially and sometimes entirely covered by them. G. have many features in common with rivers. They have regular drainage areas from which they draw their supplies; they carry along with them in their course rocks, sand, earth, gravel, etc., they reach the ocean in the forms of ice or water, and they convey their burdens of earthy matter to the sea; their influence upon marine deposits being very considerable. The distribution of G. is very extensive. They are to be found in Greenland, which is almost an entire sheet of ice; in North America, in Alaska, and dotted along

the Pacific coast. They also occur in Europe, Norway, among the Pyrenees and along the Alps; and traces of their presence in past geological ages are general, appearing over the larger part of N. America and all Northern Europe. The unexplored Antarctic continent is, to all appearance, covered by one huge ice-sheet, over 10,000 ft. thick. Of the 1155 G. in the Alps, perhaps the most remarkable is the lower G. of the Aar. It has been estimated to have a depth of about 1510 ft., and is one of the most remarkably even and accessible G. in all Switzerland. The slope of its surface is in many places only 3°. Such level and easily-crossed spaces are also found about the middle regions of the Mer de Glace, and in the lower G. of Grindelwald, and it is in such portions of a G. that internal cascades or 'moulins' occur. They arise from the surface water being collected into a considerable mass, by a long course over its unbroken surface, and then hurled with force into the first river met with. A channel is kept open by the descending cascade, which at length loses the form of a fissure, taking on that of an open shaft, sometimes of enormous depth. The middle region of the great G. of the Alps extends from the level of about 6000 to 8000 ft. above the sea—beyond 8000 ft. the snow-line is reached. Fresh snow annually disappears from the G. proper, and where it ceases entirely to melt it naturally becomes incorporated with the G. Everywhere below this region, therefore, the G. melts; but here it forms. In Fr., this snowy region is known as 'névé'; in German as 'firn.'

As ascended, the G. gradually changes from the state of ice to the state of snow. The outer layers are nearly pure snow, but the deeper ones have more consistence and break into large fragments which, at Chamounix, are called 'séracs.' The ice of the G. proper has a very peculiar structure, quite distinct from the stratification of the snow on the 'névé.' It has a remarkable veined or ribboned appearance explained by Principal Forbes as being the result of internal forces by which one portion of ice is dragged past another in a manner so gradual as not necessarily to produce large fissures in the ice, but effecting a general bruise over a considerable space of the moving body.

The delicate veins seen in the G. have their course in a parallel direction to that of the sliding effort of one portion of the ice over another. Forbes described a G. as 'an imperfect fluid or viscous body which is urged down slopes of a certain in-

clination by the mutual pressure of its parts,' but this 'plastic theory' has been objected to, in that ice is by its nature a brittle solid and not sensibly possessed of any viscous or plastic quality. One of the most important contributions to the solution of this problem was made by Professor James Thompson when he predicted that the freezing-point of ice must be lowered by pressure, and in this manner explaining the 'viscous' theory of Forbes. But in spite of the observations made by these two men and by Tyndall and others, the real cause of G. motion cannot yet be considered as satisfactorily solved.

'Moraines,' previously referred to, are one of the most remarkable phenomena connected with the work of G. They are accumulations of stones and detritus, either piled up on the sides of the G. or scattered along their surface, and have been detached from the sides of the valley or ravine, forming the bed of the G. by the action of ice.

The fissures or crevasses by which G. are traversed present another phenomenon. They are frequently over 100 ft. in depth and often covered with snow, thus adding considerably to the beauty and wonder of Alpine scenery, though they are, at the same time, exceedingly dangerous to travellers. G. abound in Switzerland, the Tyrol, Piedmont, and Savoy, but it is chiefly in the chain of Monte Rosa that they are exhibited in their greatest sublimity.

'Gravel-cones' are occasionally seen on the surface of G., and these are closely connected in origin with the 'moulins' already referred to. The G. of Aar has examples of these singular cones, but they are comparatively rare on most others.

'G. tables' are another striking phenomenon produced by a similar protective action of large stones, which have become detached from the moraines and lie on the surface of the ice, giving it the appearance of a table.

See *Théorie des Glaciers de la Savoie*, translated by Professor Forbes, 1875; Tyndall's *Glaciers of the Alps*; de Saussure's *Voyages dans les Alpes*; and Agassiz, *Système Glaciaire*, 1847.

Glacis, an open space of ground round a fortress, sloping gently down from the covered-way to the country. The insurgents are obliged to pass over it in approaching the fort, and thus expose themselves to open-fire from the defenders.

Gladbach, or **Bergisch-Gladbach**, a tn. in the prov. of Rhineland, Prussia, about 9 m. E.N.E. of Cologne. The

chief industries include: iron, steel, and zinc works, paper and papier-mâché works, and gunpowder. Coal is worked. Pop. 18,200.

Gladbach, München-Gladbach, or **Mönchen-Gladbach**, a manufacturing tn. of Rhenish Prussia, 16 m. W. of Düsseldorf. It has a fine Gothic church, the crypt of which dates from the eighth century. G. is the centre of the Rhenish cotton industry; there are many dyeing, calico-printing, weaving, and spinning works. The town grew up round the Benedictine abbey, founded in the eighth century and dissolved in 1802. Pop. 114,000.

Gladbeck, a Prussian tn. in prov. of Westphalia, about 8 m. N.N.W. of Essen. The chief industries are the manufacture of cement and coal mining. Pop. 39,000.

Gladiators. Professional swordsmen who in ancient times fought to provide public entertainment. The custom of gladiatorial fights is supposed to have come from the East, and to have been borrowed by Rome from the Etruscans. Its origin is probably to be found in the practice of honouring heroes who had died in battle by sacrificing the lives of captives. The practice spread to the funerals of all important men, the sacrifice being rendered more interesting to the spectators by the captives killing each other, and it later still became an independent form of public amusement. The first gladiatorial fight in Rome of which we have knowledge took place in 264 B.C., being arranged by Marcus and Decimus Brutus for their father's funeral. In 207 B.C. twenty-four pairs of G. fought in the Forum; in 217 B.C. Scipio Africanus arranged an exhibition at New Carthage; while Julius Caesar, Titus, and Trajan all gave huge gladiatorial shows. Augustus made some attempt to limit the number of such exhibitions, but they had become so popular that this was impossible. They were unsuccessfully prohibited by Constantine in A.D. 325, and finally abolished by Theodoric (A.D. 500). The G. were either slaves, prisoners, or criminals, who were bought and trained for the business, or freemen of the lowest class who fought for hire. They were sworn to fight to the death and any show of cowardice was punished with death by torture. The defeat of one of the combatants was marked by a cry of 'Habet' from the spectators, who then decided his fate, turning their thumbs downwards if they wished him to be killed by the victor. The victor was rewarded with a branch of palm, and sometimes received his freedom. There were several types of G., such as the 'andabatæ,' who fought blindfolded; the 'mirmillones,'

who fought with sword and shield; the 'retarii,' who had, as weapons, a net and a three-pronged lance; and the 'Thraces,' who used a short sword and a round buckler. They were occasionally mounted. Discharged G. were known as 'rudarii,' from the rudis, or wooden sword, with which they were presented. The practice of gladiatorial fights never found much favour in Greece.

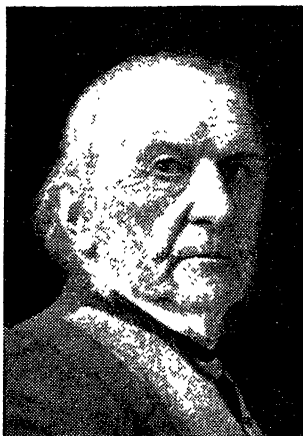
Gladiolus, the name of a genus of Iridaceæ, which comprises many beautiful species, several of which are European. *G. communis*, the fox-glove sword-lily, is frequently introduced into English gardens; *G. cardinalis*, the red sword-lily, and *G. gandavensis*, a hybrid form, are natives of the Cape.

Gladstone, Herbert John, first Viscount (1854-1930), British administrator: youngest son of William Ewart G., educated at Eton and University College, Oxford. He was private secretary to his father, 1880, in which year he entered the House of Commons; and afterwards he held several minor offices. In 1894-95 he was Chief Commissioner of Works, and from 1899 to 1905 Chief Whip to the Liberal party. He became Home Secretary in 1905, and held that position until 1909. In the following year he was appointed first governor-general of S. Africa, and he was made a viscount. He returned to England in July 1914. Died at Dane End, Ware, Herts, March 6.

Gladstone, John Hall (1827-1902), an Eng. scientist, b. at Hackney; educated at University College, London, and at Giessen. From 1874-77 he was Fullerman professor of chemistry at the Royal Institution: in 1874 became first president of the Physical Society; served on the Royal Commission on lights, buoys, and beacons (1858-61); the War Office Gun Cotton Committee (1864-68); and the London School Board, as representative for Chelsea (1873-94). Of this last body he was vice-chairman. His published works include: *Life of Michael Faraday*, 1872, written from close personal knowledge; *Miracles as Credentials of Revelation*, 1873; *Spelling Reform from an Educational Point of View*, 1878; and *Chemistry of Secondary Batteries*, 1883.

Gladstone, William Ewart (1809-98), a statesman, b. on Dec. 29 at Liverpool, and was the fourth son of John G., a Liverpool merchant, who sat in parliament from 1818 to 1827, and was created a baronet, 1846. G. was educated at Eton and at Christ Church, Oxford. At Eton he was looked upon as a boy who might do something in later life, but he did not

there distinguish himself; but at the University he began to give more definite signs of promise, for in 1830 he became president of the Union, and in the following year took a double first in classics and mathematics. Even at school G. had taken an interest in politics, and at Oxford he frequently participated in debates on political subjects. He defended Catholic Emancipation and attacked the Reform Bill in a speech so magnificent that Charles Wordsworth, with whom he read classics, ventured a prophecy that he would become prime minister. G. was now desirous to take holy orders, but his father intervened and insisted that he should enter parliament. John G. had



WILLIAM EWART GLADSTONE

influence with Peel, and his son was, at the instance of the Duke of Newcastle, returned (Dec. 1832) to the first Reform Parliament as one of the members for Newark. He sat in the House of Commons until his retirement in 1895, except in 1846, when he was Secretary of State for the Colonies. G. made his maiden speech on June 3, 1833, and this was favourably received. When at the end of the next year Peel became Prime Minister, he appointed G. as Junior Lord of the Treasury, a nomination due to John G.'s connection with Peel rather than to the young man's ability, of which as yet he had given no remarkable proof. He was promoted Under-Secretary of State for War and the Colonies in Jan. 1835, but the ministry went out in the

following April. G. gave proof of his sustained interest in ecclesiastical matters by writing *The State in its Relations with the Church* (1835) which Macaulay reviewed, referring to its author as 'the hope of the stern unbending Tories.' In Peel's second administration (1841) he was vice-president of the Board of Trade, and two years later became president and entered the Cabinet; but resigned in 1845 as a protest against the proposed increased grant to Maynooth College. In 1845-46 he was Secretary for the Colonies, and under Aberdeen, from 1852-55, was Chancellor of the Exchequer. In 1858 he went, at the request of Sir Edward Bulwer-Lytton, then Secretary for the Colonies, on a special mission to the Ionian Islands, but could not stem the agitation for incorporation with the kingdom of Greece. Under Palmerston he was Chancellor of the Exchequer from 1859 to 1865, and he introduced many reforms, including the repeal of the paper duty, in spite of the fact that he was continually thwarted by the Prime Minister, who was notoriously on bad terms with this important lieutenant. On Palmerston's death G. remained at the Exchequer and added to his duties the leadership of the House of Commons, and two years later became, in succession to Lord Russell, leader of the Liberal party. He became Prime Minister for the first time in 1868 and remained in office until 1874. G. now made the startling announcement that he intended to retire from the leadership of the party and that, while he would retain his seat, he did not propose to take an active part in debate. Lord Hartington, afterwards Duke of Devonshire, was chosen in his place, and G. for a while devoted himself to his classical and ecclesiastical studies. Private life did not, however, content him, and in 1875 he started a campaign against the gov. in connection with the Bulgarian atrocities, and again, three years later, he opposed the Afghan policy. It was, therefore, with little or no surprise that, when Disraeli was defeated at the general election of 1880 and Lord Hartington had been invited to form an administration and had failed because the ex-leader declined to serve under him, ultimately G. was sent for by the queen, and consented to form his second ministry in which, for the first two years, he was his own Chancellor of the Exchequer. In 1881, after Majuba, he made peace with the Transvaal, a policy which has since been generally condemned, and which led to the Boer War of recent years. He was in 1884 severely criticised for his failure to rescue Gordon and

for surrendering the Sudan to the Mahdi. In domestic legislation, however, he was more successful, and he introduced several Irish measures and extended the franchise to agricultural labourers and others. Owing to a defeat in the House of Commons G. resigned in 1885, but returned to office for the third time in the following year and brought in a Home Rule Bill. This measure brought about a split in the Liberal camp, a split largely due to the fact that G. was, in the first place, unwilling to yield any point, and, in the second, did not act as openly as could have been wished. The Liberal Unionists, as the Liberal opponents of Home Rule called themselves, who included Lord Hartington and Joseph Chamberlain, voted with the Conservatives and the Bill was thrown out on the second reading. An appeal to the country brought the combined Conservatives and Liberal Unionists a majority, and Lord Salisbury's gov. lasted until 1892. Then G. became for the fourth time Prime Minister and brought in a second Home Rule Bill, which was rejected by an overwhelming majority in the House of Lords, Sept. 8, 1893. G. made his last speech in the House of Commons in support of the Parish Councils Bill, on March 1, 1894, in which oration he bequeathed to his followers the task of destroying the veto of the House of Lords. Two days later he resigned the office of Prime Minister, in which he was succeeded by Lord Rosebery. G. was not a great statesman, but he was a great financier, and as a financier takes his place as a lineal descendant of Walpole, Pitt, and Peel. He was one of the best Chancellors of the Exchequer that England has ever boasted. While not averse to innovation, he conducted the finances of the country on the conservative lines that have made the British Exchequer the admiration of all nations. Many of his taxes were at the time, almost as a matter of course, bitterly opposed, but time has shown the wisdom of most of those he introduced. In other affairs he allowed himself to be swayed unduly by his emotions, allowing them to carry him to extremes which he afterwards found it difficult to justify. Sometimes, however, as in the management of the Home Rule Bill, he conceded too much to expediency, but, doing so unwillingly, did so too ungraciously, or too late, to secure the desired result. As an orator he was greatly admired. His budget speeches were wonderful and lucid. Often his other addresses were verbose and vague, but so well were they delivered, and with such fervour, that at the moment they carried the

audience away, and it was only when the printed page was consulted that the flaws were discovered. Disraeli got well within G.'s guard when he referred to him as 'inebriated by the exuberance of his own verbosity.' He scored another point when, after the Liberal leader had made a great speech, thumping his despatch box frequently to emphasise his statements, he thanked heaven the table was between him and the right honourable gentleman. G. always fervent, always convinced of his own sincerity, thought Disraeli 'devilish,' and could see no good in him. Disraeli, a more generous-minded man, regarded his opponent with amused admiration. The greatest difference between these men, who for so many years were pitted against each other, was that Disraeli had a marvellous fund of satire, irony, and humour, and that G. was sadly lacking in each and all of these qualities. With all his defects, however, G. was a great man and a remarkable figure, and, on the whole, well merited the admiration with which he was regarded. Large-hearted, generous, with high ideals, honourable, he was of the best type of an Eng. gentleman, and a man in whom the nation rejoiced. Whether his reputation as a statesman will endure is not here a matter for discussion, but his fame as a financier is established on a sure footing. He was the author of many books, the principal of which are: *The State and its Relation with the Church*, 1838; *Church Principles considered in their Results*, 1840; *Remarks on Recent Commercial Legislation*, 1845; *Studies on Homer and the Homeric Age*, 1858; and *Homeric Synchronism*, 1876. In 1896 he published editions of Butler's *Analogy*, *Sermons*, and *Studies Subsidiary to Works of Bishop Butler*. There are numerous biographies, by G. Barnett-Smith, 1879; G. W. E. Russell, 1891; Sir Edward Hamilton, 1898; Herbert Paul, 1901; and D. C. Lathbury, 1909; but the official Life is by Lord Morley (3 vols.), 1903.

Glaisher, James (1809-1903), an Eng. meteorologist, b. in London, worked from 1833-6 at Cambridge Observatory. He founded the Royal Meteorological Society, and in the course of investigations into atmospheric humidity, etc., during 1862-6, he reached a height of 7 m. Among his works are *Hygrometric Tables*, 1847; *Meteorology of England*, 1860; *Scientific Experiments in Balloons*, 1863; *Travels in the Air*, 1870; *Crystals of Snow*, 1872, and several translations.

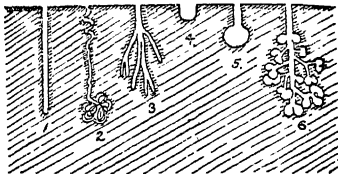
Glamis, a vil. of Forfarshire, Scotland, 12 m. N. of Dundee. Near it is G. Castle, the seat of the Earl of Strathmore, which has a famous

traditional history. It is first mentioned in actual records in the thirteenth century, but Shakespeare, in *Macbeth*, makes it the site of the murder of Malcolm II. in 1034. The paternal home of the Duchess of York. Pop. 1200.

Glamorganshire, the most S. co. of Wales, being bounded on the S. and S.W. by the Bristol Channel, on the N. by Brecknock, on the E. by Monmouth, and on the W. by Carmarthen. Area 855 sq. m. The coast to the W. is indented by Swansea Bay, beyond which is the Gower Peninsula. The N. part of the county is rugged and mountainous, the highest peak being Llangeinor (1859 ft.). These hills are the source of the rivers Taff, Ely, Neath, Tawe, Rhymney, and Llwchwr, which flow into the Bristol Channel, and to the S. of them is a large and fertile plain, with a mild climate, containing many richly wooded valleys, one of which, the Vale of Glamorgan, is known as 'The Garden of Wales.' The industrial prosperity is due to the presence of abundant mineral wealth. Coal is mined at Merthyr-Tydvil, Aberdare, Pontypridd, Rhymney Valley, Neath Valley, and Rhondda Valley; there are large blast furnaces at Cardiff, Swansea, Aberavon, Dowlais, Briton Ferry, Port Talbot, Landore, and Merthyr-Tydvil; copper, lead, and tin smelting is carried on at Swansea, Neath and Aberavon, and zinc and nickel are manufactured. Anthracite, coking-coal, ironstone, and limestone are also mined. The capital is Cardiff, and Barry, Swansea and Port Talbot are flourishing seaports. The county has five parliamentary representatives, two for the Merthyr-Tydvil borough, two for the Swansea borough, and one for the Cardiff borough. Pop. 1,253,000.

Gland. The term G. in its widest sense implies a complex of secreting epithelial cells which form the walls of cavities that are quite distinct from the lymph and blood vessels, and in which the secretion collects. All Gs. present internally a large secreting surface obtained in an immense variety of forms. In all, however, the essentials are an internal cavity or blind canal, a layer of secreting cells, and an enveloping network of capillary blood vessels. The specific characteristics and differences in the secretions depend not on any external and mechanical change, nor upon the anatomical form of the G., but solely upon the specific character of the epithelium which invests the internal secreting ducts. The actual secretory cells vary in appearance according to their previous degree

of activity. If the cells have been at rest for some time, they contain very many granules which distend the cells. After continued activity the cells are shrunken in size, and their contained protoplasm is clearer. Gs. are classified according to their functions as excretory or secretory, lubricatory or digestive. They may also be arranged in groups dependent on their origin as: (a) From ectoderm or epiblast, *e.g.* sweat and mammary Gs. In some animals specially adapted Gs. occur, as scent, spinning,



DIAGRAMMATIC REPRESENTATION
OF GLAND FORMS

1. Simple tubular gland—large intestine;
2. Coiled simple tubular gland—sweat gland;
3. Branched compound tubular gland—pyloric glands of stomach; 4, 5. Simple saccular or acinous glands (*see* INTESTINES);
6. Compound racemose or saccular gland—pancreas.

adhesive, poison Gs., etc.; (b) from mesoderm or mesoblast, *e.g.* those of kidneys; (c) from endoderm or hypoblast, *e.g.* those connected with the main part of the alimentary canal. A common form of classification is into types as: (a) Tubular, simple in large intestine, compound as in pyloric Gs. of stomach; (b) alveolar or saccular, where the secretory portion is much enlarged. These may be much complicated, as in a compound alveolar G. of the pancreas, where there is a growth of still smaller saccular diverticuli growing from the main sacculi. In general the branches of Gs. do not unite, but in one instance, the liver, this does occur, and in this case a reticulated compound G. is produced. The transplantation of the glands of one living organism to another was first attempted by Dr. Serge Voronoff (*q.v.*) in 1913 at the Physiological Station of the College of France. He proved that by grafting the sex-glands of a young animal (such as a rat, ram, or bull) upon an animal of the same species showing senility he could rejuvenate his patient and prolong its life. Later, by grafting the glands of monkeys upon human beings it was claimed that he renewed in many human subjects their youthful mentality,

physical and sexual condition. Dr. Voronoff also grafted the thyroid gland of monkeys in 1913 upon children showing signs of cretinism, and, the cerebral cells of the experimental subjects becoming stimulated by the internal secretion (hormones) of the gland, normality was in many cases achieved. In the British character there is a marked repugnance to such forms of grafting, and the operations are not performed in England. See Norman Haire's *Rejuvenation*, 1924; Dr. Serge Voronoff's *The Conquest of Life*, trans. by G. Gibier Rambaud, 1928.

Gland, in botany, an organ which produces more or less peculiar substances termed secretæ by a process known as secretion. The secretum may collect in a cavity, or it may be thrown out at the surface (excreted). Solid Gs. occur in the leaves of many saxifrages and crassulas, where chalk is excreted; in many flowers as nectaries, when honey is the secretum. Hollow Gs. are spaces surrounded by secreting cells, and the secretum may be mucilage, gum, ethereal oil, resin, etc., such as is found in many conifers, oranges, lemons, etc. The milky juice, known as latex, which is found in the dandelion, greater celandine, poppies, etc., is the secretum of Gs.

Glanders, a contagious disease of horses, asses, and mules communicated to man, to whom it is extremely fatal. It is caused by the *Bacillus mallei*, which is expelled in the discharge from the animal's mouth or nostril. It may affect the eye, mouth, nose, or any scratch, crack or sore with which it comes in contact, and thus enter the blood stream, where in the course of a week or two it produces symptoms. When weakness sets in the lungs are involved, and there are pains in the joints, with fever, thirst, hot skin, and other symptoms of infection of the whole body. When the disease has lasted for some time, the skin becomes affected, when pimples, pustules, and ulcers form. This form or stage of the disease is known as 'farcy.' There is a popular tradition that if there are only internal general symptoms, to which the term G. is applied, or if the skin alone is infected, which, as already stated, is described as farcy, either may be recovered from, but when both conditions are present the result is fatal; but seeing that the two conditions are nearly always present together sooner or later, the prospect of recovery has no connection with the nature of the symptoms that are first seen. As the disease is a distinctly rare one, it is more often feared than seen. It can only be definitely excluded from a person

who has been exposed to infection when symptoms fail to develop, and when examination of the discharge reveals the absence of the bacillus. Inoculation by vaccines is the only treatment that offers any prospect of success. G. is apt to be confused with smallpox, pyæmia, and other forms of blood-poisoning, pneumonia, rheumatism, and various fevers. It is frequently extremely difficult to diagnose the presence of the disease in stables, where half the animals may die before it is even suspected, and the new arrivals have already become affected. Every inducement should be given to owners, by offers of compensation, to report all suspected cases at the earliest opportunity, so that the disease may be stamped out as soon as possible.

Glanvill, Joseph (1636-80), an Eng. ecclesiastic, b. at Plymouth and graduated at Oxford. In 1660 he became rector of a church at Wimbish in Essex, and six years later of the Abbey Church at Bath, and in 1672 was made chaplain-in-ordinary to Charles II. He was totally opposed to the Aristotelian doctrines. His best-known work is *The Vanity of Dogmatising*, 1661, on which book Matthew Arnold founded his poem, *The Scholar Gipsy*. Among his other works are: *Lux Orientalis*, 1662; *Philosophical Considerations touching Witches and Witchcraft*, 1666; *The Ways of Happiness*, 1670.

Glanvill, Ranulf de (d. 1190), the chief justiciary of England during the reign of Henry II. He was b. in Suffolk, near Saxmundham, and about the year 1175 he was successful over the Scottish troops under William the Lion. He eventually joined the Crusaders under Richard I., and was killed at Acre. His chief work was *Tractatus de Legibus et Consuetudinibus Angliæ* (c. 1181), an edition of which was issued by Sir Travers Twiss.

Glaphorne, Henry, an Eng. dramatist of the seventeenth century. Practically nothing is known of his life, but that he was a friend of Lovelace. Most of his works seem to have been written between 1639 and 1643. Among them are *Argalus and Parthenia*, 1639; *Albertus Wallenstein*, 1639; *The Hollander*, 1640; *Wit in a Constable*, 1640; *The Ladies' Privilege*, 1640. He also wrote a poem, *Whitehall*, 1643.

Glarus: (1) A Swiss canton, having an area of over 266 sq. m. This canton, which contains part of the valley of the Linth, is a mountainous one, its highest point being Mt. Tödi (11,887 ft.). The land is mostly pastoral, and some cotton is manufactured. It is specially noted, however,

for the manufacture of a green cheese known as Schabziger. Pop. 34,000. (2) The cap. of above canton. It is a modern town, and from 1506 to 1516 Zwingli was the priest here. Pop. 5000.

Glas, John (1695-1773), founder of the Glassites, was b. at Auchtermuchty in Fifehire. In 1719 he became minister of Tealing, where he formed the sect which bears his name. It was on account of his book *The Testimony of the King of Martyrs* (1727) that he was deposed by the General Assembly. In this book he disagreed with national establish-

ments, but the city extends beyond these for a considerable distance. G. can boast of having some of the finest buildings in Scotland. Many of them are decorated with most beautiful marble. They are situated chiefly in the commercial centre of the city. George Square is the prominent square in G. and has been called the 'Valhalla of Glasgow' because of the many beautiful statues which adorn it, chief amongst which may be mentioned those of Queen Victoria, the Prince Consort, Sir Walter Scott, Sir John Moore, and Lord Clyde, James Watts, Robert Burns, and the Right



MUNICIPAL BUILDINGS, GLASGOW

L.M.S. Rly. Photo

ments in religion, and advocated the principle of independence as being nearer to the teaching of Christ. He was afterwards joined by Robert Sandeman, who became his son-in-law and gave his name to sects in other places who were known as Sandemanians.

Glasgow (from Celtic *Cleschu*, afterwards *Glasghu*, dear green spot—*glas*, green; *ghu*, dear), a county of a city and port, and is situated in the co. of Lanark, Scotland. The see of a Rom. Catholic Archbishop. It lies on both sides of the R. Clyde, which is shut in by the surrounding

Hon. W. E. Gladstone. The municipal buildings stand on the E. side of George Square; they were erected in 1889 at a cost of nearly £600,000. They are built in the Venetian Renaissance style and were modelled upon the plans of a young architect, William Young. Besides consisting of an entrance hall, grand staircase, banquetting room, and council chamber, these municipal buildings include several apartments for the accommodation of the municipal staff. The General Post Office, a colossal pile, occupies the S. side of the square, whilst the W. side is graced by two

Italian buildings, the Bank of Scotland and the Merchants' House. Other buildings of interest are the Royal Exchange in Queen Street, the news-room of which is furnished with Corinthian pillars supporting a richly decorated roof. David Hamilton is the architect, a Glasgow native, who also designed the Western Club House, as well as other public buildings. The principal streets run for the most part from E. to W. and are parallel with the river. The houses are largely built of freestone. The names of the chief streets are Buchanan Street, containing the Stock Exchange and some of the finest shops; Sauchiehall Street, in which the Fine Art Gallery and the old Art Gallery are to be found; and Argyll Street, which is the busiest commercial thoroughfare, and which leads to Trongate, the oldest portion of the city. The Trongate steeple, a relic of mediævalism, is to be seen at the E. end of Trongate, and a little further on the Cross and City Hall are approached.

The cathedral is situated N.E. of the city on a height overlooking the Molendinar stream. St. Kentigern, called also St. Mungo, founded a bishopric on the banks of this stream about 560, after which period history is silent for a space of five centuries. The see was restored by David, Prince of Cumbria, in 1115, and his preceptor John Achaisus, Bishop of Glasgow, laid the foundations of a cathedral in 1133, which were, however, replaced by the present construction by Bishop Jocelin in 1181. The cathedral is in an excellent state of preservation. Its style of architecture points to Early Eng., and it is built in the form of a Latin cross with imperfect transepts. Originally it consisted of three churches, one of which is its famous crypt with its pillars and pointed arches. The crypt was then called Laigh Kirk. The windows of the cathedral are of stained glass, some of which were manufactured in Munich, whilst those in the crypts and chapter-house were executed by various British and foreign artists.

The university of G. occupies a prominent position, standing on the top of Gilmore Hill, just above Kelvin-grove Park. It was designed by Sir Gilbert Scott, and erected in 1870. The old university was founded in 1451 by Bishop Turnbull on a different site from that occupied by the present buildings. The modern university presents a striking contrast to its predecessor. It is built in imitation of the Early Eng. style of architecture intermixed with Scots-Fr. domestic style of more recent

times. It is capped by a central tower 300 ft. high. It contains a huge library containing about 230,000 volumes. Its museum was founded in memory of the celebrated Dr. William Hunter of London in 1781, who bequeathed his splendid collection of coins, medals, etc., to the principal and professors. The university also owns an observatory and botanical garden. The students reside outside the college, and those in the Faculty of Arts wear scarlet gowns. The usual university degrees, such as M.A. B.Sc., M.D., LL.D., D.D., etc., are accorded. A railway now stands upon the ground occupied by the old university, which was built in High Street and which became enriched in 1479 by 4 acres of land and extra buildings, the gift of Sir James Hamilton of Cadzow. It was decided it should be rebuilt in 1860; accordingly three estates were bought up both by the gov. authorities and by public subscription. These estates were the Gilmore Hill Estate, value £65,000, the Dowan Hill property, £16,000, and the Clayslaps property priced at £17,400. The purchase was effected in 1864, the foundation stone was laid in 1868, and the opening ceremony took place two years later.

There are other important colleges and institutions in G., amongst which may be mentioned Queen Margaret College, and Muirhead College for women. Higher secondary and technical colleges have also been established in Glasgow, such as the Glasgow and W. of Scotland Technical College, founded in 1886 and including Anderson's College and the College of Science and Arts. There is also a Free Church theological college and a veterinary and agricultural college.

G. is an important manufacturing centre, as there are large cotton factories and chemical works; it is, moreover, one of the most important ports of the world, as it trades with nearly every civilised country. It has an extensive tobacco trade. Bleaching, printing and dyeing have made great progress, creating a corresponding increase in chemical products. Glass-making and paper-making are also carried on and there are iron and brass foundries. By the Treaty of Union, Scottish ports shared the same privileges as Eng. ports and the commerce of G. steadily increased in consequence. G. is recognised as the chief centre of the ship-building and iron industries. Nearly all the Clyde-built vessels are constructed of iron or steel, only a few wooden vessels being manufactured. The Broomielaw is the name given to Glasgow harbour, and being over 400 ft. wide, and at least $1\frac{1}{2}$ m. long, it is

able to accommodate vessels of every description. The R. Clyde is spanned by many bridges. The Dalmarnock Bridge was erected in 1891; the Rutherglen Bridge was reconstructed in 1896. St. Andrew's Suspension Bridge spans the river from the Green to Hutcheson Town, a district also approached by the Albert Bridge. Victoria Bridge, built of granite, replaces the old bridge constructed by Bishop Rae in the middle of the fourteenth century. The most important of all the bridges, the G. or Broomielaw Bridge, composed of granite, is a continuation of Jamaica Street; this was re-constructed in 1899, but it proved inadequate for the constantly increasing traffic, and the George V. Bridge was opened a short distance downstream in 1927. In 1924 further dock accommodation was required and construction was begun on land acquired by the Trust between Shieldhall and Renfrew. It is connected by rail and a road joining the new trunk road of the Glasgow corporation scheme. The chief imports are grain, flour, leather, tobacco, timber, oil, iron-ore and foodstuffs; chief exports, cotton, jute, linen goods, machinery and coal.

There are four large open spaces in G., one in each quarter of the city. The Green lies towards the E. and covers 140 acres, Queen's Park lies to the S. and comprises 100 acres, Kelvingrove Park is in the W. quarter and contains about 40 acres, whilst the Alexandra or N.E. Park consists of 85 acres. The city also possesses fine botanic gardens, containing the Kibble Crystal Art Palace, a large glass structure for popular entertainments. The population of G. has increased greatly owing to the fact that the city has grown considerably in extent. In 1889 an Act was passed placing the entire city of G., with its surrounding districts, in the county of Lanark. Two years later six suburban burghs and several suburban districts were added, thus increasing the area of 6111 acres to a total of 11,861 acres. The extreme length of G. in its entirety from N. to S. and from E. to W., is computed to cover about 30,000 acres. G. is under the control of the Lord Provost, Magistrates and Town Council of the city. There are 111 popularly-elected members of the Town Council and there are also two ex-officio members, the Dean of Guild—head of the Merchants' House—and the Deacon-Convener—head of the Incorporated Trades. The Town Councillors elect from their own number the Lord Provost, 20 Bailies, the River Bailie and the River Bailie

Depute. The work of the corporation has been a stupendous achievement, and all sorts of measures and schemes have been successfully carried through under its jurisdiction. All the water supplies, gas, and electricity, tramways, and municipal tenements are owned by the corporation. In 1914 Loch Katrine was raised 5 ft., and connected by tunnel with Loch Arklet, providing storage for 2,650,000,000 gallons of water. Additional works increased the city's water-supply by 10 million gallons per day. Gasworks were opened at Govan in 1921 and an electric generating station at Dalmarnock Bridge in 1920. Great reforms have been effected in the system of drainage. In 1897 the total area of G. was divided into three sections, each distinct, for the disposal of its own sewage. After the Great War unemployment and housing conditions were very bad and led to a strike, so that in 1925 a Rent Commission had to be appointed. With the increase in trade, in sanitary improvements, and in the extension of the city's boundaries, G. is only second in importance to the British town and seaport, Liverpool. Pop. has grown enormously of late years, in 1931 being 1,088,417.

Bibliography.—*Black's Guide to Scotland*; *Longmans' Gazetteer*.

'Glasgow,' British light cruiser (4800 tons). At the outbreak of the Great War this ship formed part of Admiral Cradock's squadron, which fought against the Ger. Admiral von Spee's squadron at the Battle of Coronel (*q.v.*), Nov. 1, 1914. During the battle she was particularly engaged by two Ger. cruisers, *Leipzig* and *Dresden* and though hit several times, escaped being sunk. She joined Admiral Sturdee's squadron, which avenged the Coronel defeat at the Battle of the Falkland Islands (*q.v.*) on Dec. 8, 1914, and was one of the ships sent in pursuit of the Gers. in the early stages of the battle, and also later on. She was responsible for sinking the *Leipzig*.

Glasgow, Ellen, one of the leading women novelists of the U.S.A., b. Richmond, Va., April 22, 1874. She has written many pieces of fiction dealing mainly with her native state. But she differs from most southern writers in not taking the super-romantic pose about her section. If occasionally she is given to melodrama, at the same time she sees her people with very clear eyes and does not spare them her satire about some of their pretensions. Among her books are *The Battle Ground*, 1902; *The Voice of the People*, 1900; *Ancient Law*, 1908; *The Wheel of*

Life, 1906; and *They Stooped to Folly*, 1929.

Glasgow Herald, the most influential existing Scottish daily newspaper. It was founded in 1779 as a weekly paper called the *Glasgow Advertiser*, but three years later the name was changed to the *Glasgow Herald and Advertiser*. In 1805 it was again changed to the *G. H.*, its then editor or conductor and part-proprietor being Samuel Hunter, a qualified surgeon and a man of many parts, who devoted himself to the service of the paper for thirty-four years. In 1859 it became a daily penny paper. It opened later in Edinburgh, where it is now published simultaneously with the Glasgow issue, as a reply to the opening by the *Scotsman*, an Edinburgh paper, in Glasgow, and it is now connected by private wire by day and night with its London offices. Many eminent Scottish writers have been either its editors or contributors to its columns. George Outram, the advocate and writer of *Lyrics, Legal and Miscellaneous*, succeeded Hunter as editor in 1837, and began reversing the anti-corn-law policy of the paper. Present editor, Sir Robert Bruce.

Glass is a hard, transparent or translucent substance, which has solidified from a state of fusion. It is apparently a solution which has solidified too rapidly to allow crystallisation to take place. Some Gs., when maintained for a considerable length of time at a high temperature, become more or less opaque, the opacity being due to crystallisation. This phenomenon is spoken of as devitrification. G. is not a definite chemical compound, but a mixture of silicates of lime, soda, and potash, with which are also associated metallic oxides and, in the case of special kinds, borates, phosphates, and other compounds. Eng. flint G. is made from sand, potassium carbonate, and red lead; plate G. from sand, sodium carbonate, and calcium carbonate; Bohemian G. from sand and the carbonates of potassium and calcium. G. as prepared from the crude materials usually employed is always coloured, the coloration being due to the presence of various metallic oxides. So, for example, the commonest kinds (e.g. bottle G.) are coloured green, the colour being caused by ferrous salts. To remove this, some oxidising agent, such as manganese dioxide, is added. This gives up a part of its oxygen at high temperatures, forming ferric salts, which colour the G. a faint yellow, and at the same time a pink colour is developed (due to manganese salts) which serves still further to neutralise

the green. When it is desired to obtain coloured Gs., metallic oxides are added. Ferrous compounds give greens, manganese compounds violet-red shades, cupric oxide blue green, cuprous oxide and colloidal gold ruby colour, cobalt compounds blues, silver oxide yellow. In milk G. the semi-opacity is obtained by the addition of materials such as the oxides of tin and arsenic or calcium phosphate.

History of glass manufacture.—The earliest specimens of glass-ware seem to have been made in Egypt, though the anct. Assyrians were also expert in glass-making. There is a whole series of Assyrian clay tablets (from the library of King Assurbanipal, seventh century B.C.), dealing with glass-making, in the British Museum. It was, however, not until Greco-Rom. times that any considerable development of the industry took place. The Romans greatly developed the industry, and were acquainted with the arts of glass-blowing and sheet-making. From the eleventh to the sixteenth century Venice was the home of the art of making beautiful vessels of glass-ware, and towards the end of this period there were produced objects of art which have never been excelled and, in the opinion of many, not even equalled. The manufacture of G. gradually spread over Europe, and from comparatively early times G. has been made in England. Venetian G. was made in London in the sixteenth century, and from that time onwards G. of all kinds has been made, but it was, perhaps, in the eighteenth century that Eng. work stood pre-eminent. That this was so was chiefly due to the fact that the Eng. flint G. was greatly superior in brilliancy to the Bohemian product and lent itself especially to the art of cutting. In America, much fine glass was made by the Ger. emigrant Heinrich Wilhelm Stiegel about the middle of the eighteenth century. Great progress has been made of recent years in the manufacture of many varieties of G. specially adapted for optical purposes.

Kinds of glass.—There are three main kinds of G., viz., blown G., which includes tube and sheet G., pressed G., and optical G. The constituents and methods of manufacture vary and will be described below.

Manufacture.—(1) Blown G. Three varieties are used: potash-lead G., potash-lime G., and soda-lime G. The potash-lead G. is chiefly used for making table G., and is often known as crystal. Its percentage composition is silica (SiO_2), 53 per cent.; potash (K_2O), 14 per cent.; lead oxide (PbO), 33 per cent. The soda-lime G. corresponds in the main with the Venetian

G., and the potash-lime G. with Bohemian G. so largely used in the manufacture of chemical apparatus. The materials to be used are mixed ('fritted') in crucibles made of refractory fire-clay, *e.g.* Stourbridge clay, after these have been placed in furnaces and heated to a high temperature. Wherever possible the materials are mixed with broken G. of the same kind (technically called 'cullet'). The object of this addition is to increase the fusibility of the mass. The crucibles are open when the furnace is fired by gas, but are covered where coal is used, or in the manufacture of flint G. Eleven crucibles AA are placed round the walls of the furnace with their mouths opposite holes in the furnace wall, through which the molten G. can be withdrawn. The flames pass through the fire-grate B, play on the arch or crown D, and the flue gases then escape into the chimney C. When all is melted the temperature is further raised, and the mass rendered quite liquid, in order to promote the escape of bubbles of air. The temperature is then allowed to fall until the G. becomes viscous. It is then removed from the pots and worked up by the glass-blower who employs tools of extraordinary simplicity. It is a remarkable fact that the tools now employed are almost the same as those used in the seventeenth century. The principal ones are a blowing-iron, an iron tube, tongs of the sugar-tongs type, and scissors. Or instead of being blown, it may be drawn out into tube. In the manufacture of sheet G., large tank-furnaces are used. The tanks, which are sometimes capable of holding 250 tons, are made of fire-clay, and the furnaces are similar in many respects to the type used in the open-hearth steel process. They are heated entirely by gas. G. is withdrawn by means of a 'pipe,' *i.e.* an iron tube 5 ft. long which has been previously heated. A lump of molten G. adheres to the end of the pipe, which by rotation is made to assume an approximately spherical shape; this is again dipped into the molten G., and the process repeated until a mass sufficient to make the sheet required is obtained. It is then blown into a hemispherical shape in a mould, and afterwards converted into a cylinder with one end (*i.e.* the end away from the pipe) closed. By closing the pipe and heating the dome-shaped end, the latter is caused to burst, leaving a cylinder, which is detached from the pipe by touching the G. near the pipe with a cold iron. The hollow cylinder thus obtained is cut with a diamond so that the ends are made parallel, and then a longi-

tudinal split is made in the same way. It is then once more softened in the furnace, placed upon a flat base, opened out and rubbed down to an even surface with a 'rubber' which is often made of charred wood. Various mechanical devices for this kind of G. manufacture have been introduced, but the bulk of sheet G. is still made by the above-described process. In the older process for making crown G., the

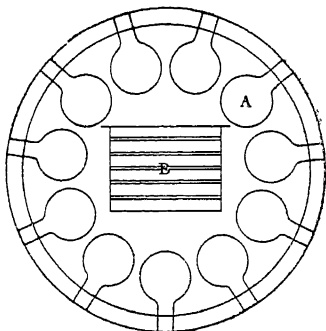


FIG. 1

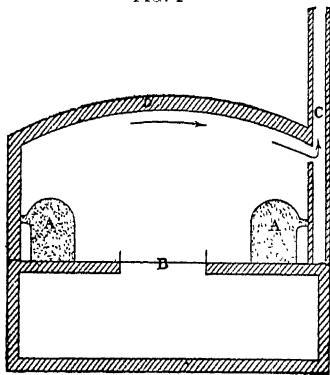


FIG. 2

Fig. 1, Plan. Fig. 2, Section (vertical) of modern furnace for glass manufacture: AA, crucibles; B, firegrate; C, chimney.

ball of molten G. was blown into a sphere flattened on the side away from the pipe. This sphere is made to burst just opposite to the pipe, and then by rapid rotation the whole mass is forced to assume the shape of a disc. The lump of G. surrounding the pipe is known as 'bullion' and the old crown-glass windows owe their charac-

teristic appearance to this. In addition to the above varieties of G., mention must be made of the great industry of bottle-blowing. The older methods of blowing the G. in a mould are being rapidly superseded by a process in which all the operations previously necessary for the manufacture of a bottle are conducted mechanically, compressed air being used to 'blow,' and a plunger to force the molten material to the shape of the mould. Bottles made by this method are cheaper than the old-fashioned kind, and possess the great advantage of uniformity in size. (2) In the preparation of the variety known as plate G., the melting takes place in pots or crucibles, and never in tanks. Great care is required in the selection of the materials used, and particular attention must be paid to the purity of the sand, lime, and soda, as even small traces of foreign bodies would, taking into consideration the comparatively great thickness of the plate, cause an appreciable depth of colour. The contents of the pot are poured out on to a flat table, and there rolled out into sheets varying in thickness from $\frac{1}{4}$ in. to 1 in. or more. The rollers vary in weight—some weighing as much as 5 tons—and are driven by power. Guides moving in front of the roller determine the width of the sheet, the thickness depending upon the depth to which the roller is lowered. After rolling, the plate is allowed to cool to a point when distortion is no longer to be feared, and is then transferred to the annealing kiln, where it rests on a bed of fireclay blocks. When cool (under modern conditions four to five days usually suffices for annealing, though occasionally considerably longer is required), the plates are removed and polished by grinding either against similar plates or against iron. Between the polishing surfaces sand or emery is placed, and the final polish is obtained by the use of pads of leather treated with rouge. (3) Optical G. requires the most particular attention, not only as regards the selection of raw materials, but also as regards the quality of the crucible used, and the proper regulation of temperature and other factors. For instance, homogeneity is an essential quality for optical work, and this can be secured only by adequate stirring at the appropriate time. The fused mass, after being heated for such time as is deemed necessary for the removal of air-bells, and after stirring to secure a homogeneous product, is allowed to cool until solidification sets in. When this has occurred, the furnace is sealed, and the further cooling allowed to

proceed quite slowly. When cold, the crucible is removed, broken, and the fragments removed from the G., which may be found in one large mass, or broken into smaller lumps. The product is carefully examined for flaws, and any pieces with marked defects are rejected. The accepted G. is once more heated to the softening-point, moulded into the required shapes, and then subjected to a prolonged process of cooling. Further close examination reveals a large percentage of defective pieces, so that it is not surprising that the price of good optical G. is high. Optical Gs. are required to fulfil in greater or less degree the following demands. They must be homogeneous, transparent, free from colour and internal strain, stable to atmospheric influences, of a certain degree of hardness to resist scratching, and possess specified refractive and dispersive powers. All articles made of G. require, after the heating necessary for their manufacture, to be slowly and homogeneously cooled. This is necessary owing to the fact that G. is a bad conductor of heat, so that the external layers which cool first enclose portions which cannot contract on cooling. These portions thus remain in a state of tension which is readily disturbed by a slight increase in temperature or sudden change due to a slight scratch. G. may be toughened either by heating to redness, and then suddenly immersing in oil at a temperature of 300° , or by allowing to cool after heating between hot metal plates.

Safety glass is glass designed to obviate the risk of injury or damage by broken fragments if the glass is shattered. Wired G. comes into this category. It consists of glass in which wire netting has been embedded while the glass is still semi-molten. Triplex G. consists of two layers of glass between which is a sheet of transparent cellulose or cellulose derivative, the three being firmly held together by a transparent collodion or similar adhesive. In the manufacture, the triple material is slightly heated and subjected to high pressure in a hydraulic press. Triplex glass may be broken, but the splinters do not fly, as they are held by the cellulose-derivative layer.

Ultra-violet ray glass is glass that allows rays of shorter wave-length than the visible violet of the spectrum to pass through it. Ordinary glass is opaque to these 'ultra-violet' radiations, which are nevertheless photographically and chemically active and have definitely beneficial therapeutic effects, e.g. in cases of rickets. Much ultra-violet G. is similar in general composition to

ordinary window G., but its iron content is kept as low as possible and it contains about 2 per cent. of oxide of boron. Fused silica glass is also transparent to ultra-violet rays.

Glass, Carter, American democratic senator; b. Jan. 4, 1858, at Lynchburg, Va. Learned printing, served 8 years in mechanics' dept. of printing-office. Became owner of *Daily News* (morning) and *Daily Advance* (afternoon), Lynchburg. Member of Virginia senate, 1899-1903. Member, State Constl. Convention, 1901. Member, 57th Congress, 1902-3, and re-elected 58th and 59th, 1903-19, 6th Va. dist. Resigned, 1918. Sec. of Treasury in Wilson's Cabinet, 1918-19. U.S. senator, 1919-31.

Glass-crab, the name given to *Phyllosoma*, the young form of *Palinurus*, a genus of edible crustaceans found in the Mediterranean.

Glasse, Hannah, an Eng. writer on cookery of the eighteenth century. She seems to have been a London habit-maker, and a Rom. Catholic; to have gone bankrupt in 1754, and d. before 1770. Her most famous work was *The Art of Cookery*, 1747, and she also wrote *The Compleat Confectioner*, about 1769, and *The Servant's Directory*, 1770.

Glassites, a Scottish religious sect, founded by John Glas or Glasse (1695-1773). He was a Scottish divine, b. at Auchtermuchty, Fifeshire, who, in 1719, obtained the charge of Tealing in Forfarshire. Owing to the views which he promulgated here, he was removed from the ministry in 1730, but in 1739 he was restored by the General Assembly to the position of 'a minister of Jesus Christ,' being still forbidden to assume the title of 'a minister of the Kirk of Scotland.' The sect which he formed, also known as the Sandemanians, from Robert Sandeman (1718-71), a disciple of Glas, practised community of property, abstinence from certain kinds of flesh food, the weekly celebration of communion, and the holding of 'love-feasts.' It detached itself from the Presbyterian body to join the Independents.

Glass-snake, the name applied to all individuals of the genus *Ophisaurus*, family Anguillidae; they are serpent-like lizards about 3 ft. long, with rudimentary limbs and an elongated, brittle tail. *O. ventralis* is common to N. America, and in many ways resembles the British slow-worm; it lives on snails, worms, insects, etc., and spends much of its time underground. *O. gracilis* inhabits the E. Himalayas and Burmah. *Pseudopus*, an allied genus, is found in S. Europe.

Glasswort, or *Salicornia herbacea*, a species of leafless herbs belonging to the family Chenopodiaceae, and also called marsh samphire, crab-grass, etc. It grows on the seashore and in salt marshes.

Glastonbury. This tn. was once an island, but now forms a peninsula, as it is surrounded on three sides by the R. Brue. It was originally called the Island of Avalon or Apples, and is one of the most picturesque spots in Somersetshire. It has many interesting historical features. G. is famed for its abbey, which dates back to the year 708, when it was built by the Saxon, Ina, in place of the British monastery founded about 601. The abbey is a ruin, and includes different periods of architecture. The ruins of the church, St. Joseph's Chapel, and the Abbot's Kitchen, are the only surviving buildings. St. Joseph's Chapel is the finest portion of the ruins and points to the Transition period of the twelfth century. It is remarkable for its crypt, which was not inserted beneath it until the fifteenth century. There is a legend that Joseph of Arimathea came over to G. and founded a church there; moreover, he is stated to have planted a graft from the Sacred Thorn there. G. Tor is a hill upon which the last abbot of G. suffered capital punishment for 'divers and sundry treasons,' 1539. A lake-village was discovered in G. in 1892, pointing to the existence of Keltic tribes. Other features of interest are the Market Cross and St. George's Inn. Pop. 4300.

Glatz, a fortified tn. in Silesia, Prussia, on R. Neisse, near the Bohemian border, and 58 m. S.W. of Breslau. It is strongly defended by two citadels, one on an eminence of 200 ft., and has had an adventurous history. There are manufs. of hardware, machinery, furniture, and spirits. Pop. 16,500.

Glauber, Johann Rudolf (1604-68), a Ger. chemist, b. in Karlstadt, Franconia. He is chiefly famous for his discovery of G.'s salt (*q.v.*), which he prepared, in 1658, and identified with a natural mineral salt found in waters throughout Europe, and having a medicinal value. He also produced hydrochloric acid from oil of vitriol and salt. He was an alchemist and voluminous writer. His *Opera Omnia* (Amsterdam), 1661, was translated into Eng. in 1689.

Glauber's Salt, or Sodium Sulphate ($\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$), is prepared by heating salt with sulphuric acid and crystallising the residue from water, from which it separates as colourless prisms having ten molecules of water of crystallisation, which are lost on prolonged exposure to the

air. G. S. has a cooling, bitter, and saltish taste, is a mild laxative and diuretic, and is present in the waters of Carlsbad, Cheltenham, etc.

Glauchau, a tn. of Germany, in Saxony, situated in the circle G., on the Zwickauer Mulde, 6 m. N.N.E. of Zwickau, and 36 m. S.S.E. of Leipzig. It is a busy industrial centre; the chief manufs. are cloth and woollen goods, paper, beer, etc. There are also calico-printing factories, dye works, saw and flour mills, iron works, etc. Pop. 27,300.

Glaucoma. The literal definition of G. is a white eye, from the appearance of the blind eye in which the disease runs its course. It is one of the commonest forms of blindness at and after middle life, when it causes interference with vision. There is also considerable pain, which may lessen, however, as the sight becomes affected. G. is due to an increase in the fluid of the eye, from disease within the eye itself. *Treatment*.—Drops, local applications, and care of the general health have little effect. Skilled surgical operation should be resorted to at an early stage, when vision may be retained or restored. It may, however, be necessary to remove the damaged eye, in order to preserve the vision of the unaffected one.

Glauconite, a hydrated silicate of iron and potassium found in the muds deposited at the bottom of the sea. The various colours of these deposits are probably due to the presence of G., which is itself green. G. occurs in masses of minute crystals; these masses are often rounded, and it is believed that they represent casts of the shells of Foraminifera which after dissolution of the shell are liberated. It is possible that such casts have been broken down into fine particles and so distributed amongst the different deposits. G. is found rarely in the oldest rocks, but more plentifully in the Secondary and Tertiary formations.

Glaucus, the name given to a genus of nudibranchiate gastropods found in the Atlantic and Pacific Oceans; they have long, slender, slug-like bodies, with three pairs of lateral out-growths, and the heads are furnished with tentacles. They are of a greenish-blue colour, whence their name.

Glaucus. In Gk. mythology: (1) The builder and steersman of the *Argo*, who escaped unscathed from Jason's fight with the Tyrrhenians, but sank to the bottom of the sea and became an ocean divinity, often surnamed Pontius. (2) A charioteer, the son of Sisyphus, King of Corinth, and Merope, daughter of Atlas,

often surnamed Potnieus. He wished to enrage Aphrodite by the exceeding swiftness of his mares, and the goddess inspired them with such fury that they tore him to pieces. (3) A Lycian prince, son of Hippolochus and grandson of Bellerophon, who was an ally of Priam against the Gks. in the Trojan War. He had a famous conversation with Diomed, and exchanged his own golden armour for Diomed's iron suit. He was killed by Ajax. (4) A son of Minos II. and Pasiphaë, who was smothered in a tub of honey, but restored to life by Polyidus, the soothsayer.

Glazebrook, Sir Richard Tetley, physicist; b. Sept. 18, 1854; son of Nicholas Smith G., Liverpool. Educated: Liverpool College; Trinity College, Cambridge (scholar)—5th Wrangler 1876; Fellow 1877. Principal, University College, Liverpool, 1898-9. Director, National Physical Laboratory, 1899-1919. Knighted, 1917. K.C.B., 1920. Professor of Aviation and director of department of aeronautics, Imperial College of Technology, 1920-3. Publications: Treatises on physics.

Glazing is the art of fixing glass into supporting frames, e.g. windows, doors, roofs. The glazier of the less specialised type may cut the glass himself, but more frequently glazing and glass-cutting are two entirely separate crafts. The actual fixing agent employed is putty. This is a mixture of whiting (calcium carbonate, CaCO_3) and 'boiled' linseed oil (i.e. linseed oil previously heated to about 150°C . with litharge, lead acetate or some similar 'drier'). On exposure to the air, the putty hardens and thus keeps the glass in position. In glazing, the putty is usually spread by hand, the glass placed in position and held by nails, and the putty then trimmed with a putty knife. Putty is not generally used for indoor glazing, appropriate wooden headings serving the purpose both efficiently and more elegantly. Frames or sashes for holding the glass are made of wood or metal; of the latter material lead is used for small lights, chiefly for decorative purposes. The small pieces of glass are placed in the lead framework, and the edges of the lead are then pressed over. Much so-called leaded glass consists of large panes on to which a sham framework of lead has been cemented. Various kinds of glass are used for particular types of glazing; thus for glass roofs and skylights 'wired glass,' i.e. glass with wire-netting in it, is commonly employed, while safety glass (q.v. under GLASS) finds wide application in motor vehicles, etc.

Glazounov, Alexander Constantino-

vich (b. 1865), a Russian composer, *b.* at St. Petersburg. He composed his first symphony at the age of eighteen, and its success decided his future career. He went to Germany, where he became acquainted with Liszt, and under his advice he devoted himself to composition. In 1889 his second symphony and his symphonic poem, *Stenka Razin*, appeared. These were followed by numerous compositions, including symphonies, overtures, marches, chamber music, songs, etc., and music for the ballets *Raymonde*, *Les Saisons*, and *Ruse d'amour*.

Glebe Land: (1) In ecclesiastical law is the land which belongs to a church as its dowry. Every church is entitled of common right to house and glebe, and formerly no church could be regularly consecrated without such house and land. Where an incumbent before his death has manured and sown G. L. at his own cost with corn or any other grain, he is entitled to dispose, by his will, of all the profits accruing from the crops sown by him. Where the total income of the incumbent of a united benefice appears to be more than sufficient for his due maintenance, the whole or some specified part of the G. Ls. may be given as a perpetual endowment for the support of any adjoining poor benefice. G. L. generally speaking is exempt from tithe consistently with the canon law maxim, that the church shall not pay tithes to the church. The exemption does not, however, extend to the lessee of the vicar, and where a parson leases G. L. without also granting the tithes thereof, the tenant must pay tithes to the parson. But where a parson leases his rectory, reserving G. Ls., he must pay the tithes to his lessee. Sales of G. Ls. may now be effected by incumbents under the Glebe Lands Act, 1888, with the approval of the Board of Agriculture. Money paid by a railway company on the compulsory purchase of G. L. may, by leave of the Chancery Division, be applied in improving the parsonage house. (2) In the civil law (*q.v.*) G. L. denotes the soil of an inheritance, and the serfs of the glebe were said to be *glebe adscripti*, or attached to the soil. See Phillimore's *Ecclesiastical Law*; Goodeve, *Real Property*.

Glee, in music, a vocal composition in at least three parts, each taken by only one voice and consisting of two or more contrasted movements. The subject may be of any type, and a G. is sung unaccompanied, usually by male voices. It is distinguished from a madrigal by having no contrapuntal harmony, and from a part-song by the independence of its parts.

It is entirely English in origin and cultivation, and its best period was during 1760-1830, the most famous composers of Gs. being Dr. Arne, Samuel Webb, Stevens, and Callcott.

Gleig, George Robert (1796-1888), a Scottish author, *b.* at Stirling. Entered the army, and served in the Peninsular War (1813), and in America (1814). In 1820 he took orders; became chaplain of Chelsea Hospital, 1834; chaplain-general of the forces, 1844; and inspector-general of military schools, 1846. He was a most voluminous writer and his works include: *The Subaltern*, 1825, his best-known novel, founded on incidents in the Peninsular War; *The Hussar*; *Chelsea Pensioners*; *The Campaign of New Orleans*; *The Story of the Peninsular War*; *History of India*, 1830-5; *Lives of Military Commanders*, 1831; and *Lives of Warren Hastings*, 1841; *Clive*, 1848; and *Wellington*, 1862.

Gleim, Johann Wilhelm Ludwig (1719-1803), a Ger. poet, *b.* at Ermsleben, near Halberstadt. He gave great encouragement and assistance to the young and ambitious poets of his day, and on this account earned for himself the name of 'Father G.' His efforts, however, in this direction were not of a sufficiently judicious and discriminating nature. He wrote a good deal of moderate poetry, his patriotic *Lieder* *Eines Preussischen Grenadiers* displaying considerable force of expression and genuine sentiment. His other works consist chiefly of odes and, in the style of Horace and Anacreon, rhymed songs and fables, etc. See Körte, *Gleim's Leben*. He *d.* at his native town.

Gleiwitz, a tn. of Germany, in the prov. of Silesia, situated 24 m. N.E. of Ratibor. It manufs. woollens, has glass works, and has a royal iron foundry, meal mills, etc. Pop. 81,500.

Glen, William (1789-1826), a Scottish poet, *b.* in Glasgow. He was the son of a merchant, and first took to trade and farming, but he soon gave these up and published a book of poems in 1815. He is remembered for his popular song, 'Wae's me for Prince Charlie.'

Glenalmond, in Perthshire, Scotland. The name given to the valley of the R. Almond, the finest part being called Sma' Glen. It is one of the most picturesque valleys of Scotland. An important Episcopalian institution is situated here, about 10 m. N. of Perth, called Trinity College, founded in 1841 with the idea of raising a Scottish Episcopalian public school on the model of the great English ones. Gladstone was the main initiator of the project.

'Glenart Castle.' A British hospital ship which was torpedoed and sunk on Feb. 26, 1918, by a Ger. submarine in the Bristol Channel regardless of the fact that the boat was showing the Red Cross and, in all respects, conforming to the requirements of The Hague Convention as to hospital ships. Only 38 persons out of 200 were saved.

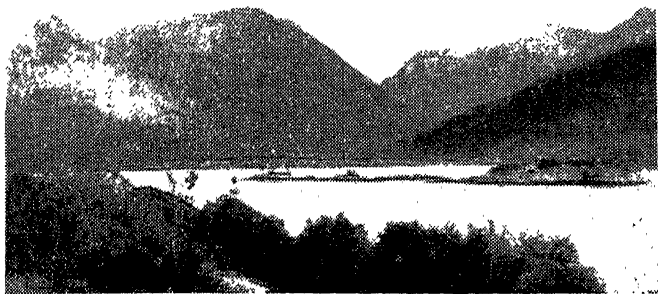
Glencairn, Earls of. This title was first borne by Alexander Cunningham of Kilmaurs, Ayrshire, who was created earl (1488), and *d.* shortly afterwards. It is taken from a parish of Dumfriesshire, Scotland. Among the more famous earls were :

William, fourth Earl (*d.* 1547), who supported Henry VIII.'s Scottish

Baillie, *Letters and Journals*, i. 206; ii. 45; iii. 255; Thurloe, *Historical Memoirs*, i. 495.

James, fourteenth Earl (1749-91), was a friend of Burns. The title became extinct with *John*, fifteenth Earl, 1796.

Glencoe: (1) A wild, gloomy valley of Argyllshire, Scotland, near the head of Loch Etive, extending from Ballachulish E. for 10 m. The mountains rise perpendicularly on either side (3000-3800 ft.). The bed is swept by Ossian's 'dark torrent of Cona' (R. Coe), which enters Loch Leven. Pop. about 2530. The Pass is noted for the treacherous massacre of the MacDonalds in February 1692, brought about by Dalrymple and Captain



[L.M.S. Rly. Photo.]

LOCH ETIVE AND THE ENTRANCE TO GLENCOE

policy and opposed the Duke of Albany. He joined Angus and Lennox (1524) to place their young king under control of a council of regency. He was defeated (1544) at Glasgow Muir by Arran. See Sadler's *State Papers*; Douglas, *Scotch Peerage*, i. 633-6.

Alexander, fifth Earl (*d.* 1574), third son of preceding, supported Knox and the reformation in Scotland, and composed a satirical poem against the Grey Friars, who had persecuted G. Buchanan. See Knox, *Works* (Lang's edition, i.-iv.); Sibbald, *Chronicles of Scottish Poetry*; Register of the Great Seal, ii.; Calderwood, *History of the Church of Scotland*, i.-vi.

William, ninth Earl (c. 1610-64), organised the Highland rising of 1653, but was defeated at Dunkeld, 1654. He warmly supported Charles II., becoming Lord Chancellor of Scotland on the Restoration. See

Campbell. See Macaulay, *History of England*. (2) A hamlet of N. Natal, S. Africa, on the railway from Ladysmith to Dundee.

Glen Cove, a tn. of New York, U.S.A., in Nassau co., on the Hempstead and G. branch of the Long Island Railway. There are flour mills and a starch factory. Pop. 11,430.

Glendalough, a mountain glen of Ireland, situated 10 m. N.W. by W. of Wicklow, and 8 m. from Rathdrum station. It is watered by the stream Glencol, a trib. of the Avonmore, and is famous for its picturesque beauty. The ruins of an ancient city, which, from the sixth century to 1214, was a bishop's see, are situated here; chief among them are 'Seven Churches,' one of which was the ancient cathedral.

Glendower, Owen (Owain ab Gruffydd) (c. 1359-1416), a famous Welsh chieftain claiming descent from

Llewelyn and the ruling princes of Wales, an opponent of the English in Henry IV.'s reign. He had been patronised by Richard II., but was at first a follower of Henry IV. until local troubles made him rebel. He laid claim to the crown of Wales (1402), and refusing a definite engagement, checked two English expeditions by wearing out the king's forces among his mountain fastnesses. G. defeated the English near Knighton, 1402. On the third English march to Wales, he retired to the mountains. With Mortimer and Hotspur he formed a conspiracy against Henry, but was defeated at Shrewsbury (1403). He also allied with Scotland, Ireland, and Charles VI. of France. In 1405 he was defeated by Henry, Prince of Wales, but remained hostile to the end of his days. He was the last champion of Welsh independence against the English kings. See Shakespeare's *Henry IV.*; Bradley, *Biography*; *Dict. of Nat. Biog.*; Wylie, *History of England under Henry IV.*, 1881-94; Thomas's *Memoirs of Glendower*, 1822; *Retrospective Review*, xiii., 1826; works of Iolo Goch and Lewis Glyn Cothi; Ellis, *Original Letters*.

Glenelg, a tn. and watering-place of S. Australia, situated in Adelaide on the W. coast on Holdfast Bay, and is 5 m. S.W. of Adelaide. Here in 1836 S. Australia was formally proclaimed to be a British colony. It is connected with Adelaide by two lines of railway. Pop. 4000.

Glenmore, or the **Great Glen**, a valley of Scotland which stretches for more than 60 m. across the central part of the country, from the N.E. at Inverness to the S.W. at Fort William. The Caledonian Canal, which was constructed by connecting the lochs, Ness, Oich, and Lochie, flows through the glen.

Glens Falls, a city of New York state, U.S.A., in Warren co., 55 m. N. of Troy, situated on the Hudson R. and connected with Champlain Canal. It has a descent of about 50 ft. between cliffs of black marble. There are valuable quarries and Portland cement works. The town possesses a Crandall free library, state armoury, hospital, etc. It is an old Quaker settlement of about 1763. During the Revolution of 1780 it was burned to the ground, but was rebuilt. Pop. 18,531.

Glen Steamship Line, a line of steamships running between London, E. India, China, and Japan (*Glenloch*, 1896; *Glenroy*, 1901; *Glenstrae*, 1905), founded by the ship and insurance brokers, McGregor, Gow & Co., Ltd., about 1882. One of the few lines now owned privately, it has

both passenger and cargo steamers. London offices, 20 Billiter Street, E.C.

Glentilt, a glen in N. Perthshire, Scotland, watered by the Tilt. It extends from Blair-Athole for a distance of 13 m. At its upper part it is hemmed in by high mountains, and numerous torrents flow down their slopes through the glen. The rock formation here is geologically interesting; white, grey, and green marble have been quarried.

Gliding, the art of flying in an aeroplane, without the use of engines of power, by taking advantage of the natural currents of air and the law of gravitation. The first principle involved in this kind of flight is that by the skilful arrangement of planes on a flying machine its fall can be retarded in such a way as to make the fall itself a means of propelling the aeroplane over a long distance. The plane, with power behind it, can also take advantage of the law of gravitation in this manner. But whereas the power machine can elevate the front of its planes and, by driving against the wind, climb to a desired height, the machine without power must find other means. Here, use is made of the second principle, which is based on the fact that the air currents in passing over uneven or hilly ground follow the contour of the land over which they pass, and though, in relation to these currents, an aeroplane may be falling all the time, the breeze that blows up the side of a long and fairly steep hill actually lifts to a greater height any plane floating with it. Skilful manipulation of the plane enables the glider to take advantage of these two principles to cover long distances. By alternately 'soaring,' or making use of the lift of these upward currents, and 'gliding,' or using the pull of gravitation as a means to cover distance, the airman can now remain in the air for an almost indefinite period. The art of gliding was an important part of the development of flying, and continues to afford useful information. Long before the progress of the motor-car turned the attention of inventors and engineers to the possible uses of very powerful engines in very small compass, experiments were being made in heavier-than-air flying machines, which, starting from high ground, should fly a long distance before landing. Among the most successful pioneers in this form of experiment were the two brothers Lilienthal, Chanute and Montgomery, whose experiments gradually led to the adoption of the general form and principle of the flying machine, which has become more or less standardised.

Glinka, Mikhail Ivanovich (1804-57), Russian composer; b. at Novospaskoi, of noble family. Chief operas, *A Life for the Tsar* (1836) and *Russian and Ludmilla*, 1842.

Globe, a tn. of Arizona, U.S.A., situated in Gila co., of which it is the capital, and 90 m. N. of Tucson. It is the centre of a copper mining district and stands third in the U.S.A. for production. Gold, silver, asbestos, quick-silver and coal are also found. Pop. 7159.

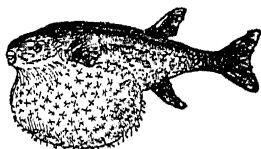
Globe, The (or more fully, **The Globe and Traveller**), started in 1803 as a sixpenny paper by a syndicate of publishers primarily with the object of securing to themselves an advertising medium. Its first editor was George Lane, and other prominent member of its staff or contributors from time to time were James Bacon (subsequently Vice-Chancellor Sir James Bacon); R. H. Barham, author of *Ingoldsby Legends*; Thomas Love Peacock, satiric novelist, poet, and official of the East India Company; and Frédéric Bastiat, the Fr. economist. In 1842 it took over its old rival the *Courier*. Later, at the ebb of its fortunes, it was changed into a Conservative paper, its new proprietors including Sir Stafford Northcote, who lowered the price to one penny. Afterwards it became the property of one its editors, Captain (subsequently Sir George) Armstrong. In 1907 it was sold to Sir Ildebrand Harnsworth. Following a somewhat lively career, the paper came to an end soon after the Great War.

Globe-fish, the name given to several genera of Teleostean fishes which are grouped under Gymnodontes. They are so named because

Tetrodon and *Diodon* are the best-known genera, *D. hystrix*, the sea-hedgehog, being the largest of all the species.

Globes, spherical maps representing the appearance of the heavens or the earth. A terrestrial G. naturally conveys a far more accurate impression of the relative areas of land and water and of the true position of any one place with regard to another than can possibly be given by a flat projection, where angles and distances are of necessity distorted. A G. reproduces in miniature the spherical shape of the earth, only that no account is taken of the flattening at the poles. It is constructed as follows: layers of paper are pasted on to a wooden or iron matrix. At the poles are metal meridian circles through which pass the ends of the central axis round which the G. is made to revolve. The meridians and parallels are drawn on a composition of whitening, glue, and oil with which the sphere has been coated. Great care is needed to attach the gores or segments (from twelve to twenty-four in number), on which the map is already printed, to the G. Formerly the preparation of a G. was a laborious process, as it was painted by hand or else engraved on copper. For schools and libraries a G. is made to rotate round its own axis in a somewhat larger metal meridian, which in its turn is fitted into a horizontal wooden ring fastened to a stand. The gores, it should be added, are now prepared on strictly mathematical principles. A normal G. has a diameter of 12 or 18 in. At the Paris Exhibition of 1889 an interesting G. was on view, which was an exact model of the earth, only a million times smaller. Thus the equator measured 40 metres, which represented 40,000 kilometres, the actual circumference of a great circle. Such a sphere would make the calculation of distances an easy matter. Sometimes a G. is embossed to show the highlands and lowlands. Compound G. are also made, the celestial G. being of glass and enclosing the terrestrial. Accessories, such as a flexible quadrant to measure distance between any two places, a compass usually put below the sphere, and an hour-circle round the N. pole, are indispensable if the G. is to be used for solving geographical and astronomical problems. On the celestial sphere the stars are drawn as it is calculated they would appear if looked at from the centre of that sphere, the relative positions and distances of the stellar bodies being exactly the same as they appear in the actual heavens.

Celestial Gs. seem to have been



GLOBE-FISH

of their power of distending the gullet with air, and thus assuming an almost globular form. Most of the species are found in tropical and sub-tropical seas, where they feed on corals, molluscs, and crustaceans, for which their hard, beak-like snouts are peculiarly adapted. Some of them are highly poisonous, and most of them are armed with spines of differing shape and size; they vary in size from a few inches to two feet, and are nearly always brilliantly coloured.

made first. Thus they were understood in the days of the Venerable Bede, and some were contrived by Gerbert of Aurillac (929). The oldest of the Arabian celestial spheres is now in the Florence Museum, and another, dated about 1225, can still be seen at Velletri. A certain scientist of China, Ho-shing-tien, devised such a sphere as early as 450, whilst to turn to Gk. civilisation the celestial sphere of Hipparchus (c. 150 B.C.) was still on view in the great library of Alexandria in Ptolemy's day. In the Naples Museum is one which is believed to be as old as the fourth century B.C. The Laon and Nuremberg terrestrial Gs. are contemporary with Columbus, who was certainly familiar with similar maps (c. 1492), and there exist reliable illustrations of the terrestrial sphere of Crates of Mallus (d. 145 B.C.) actually with America and Australia roughly sketched.

Globe Theatre. In the year 1868 this theatre was opened in London, the first production being one of H. J. Byron's pieces, entitled *Cyril's Success*. There was also a theatre of the same name which stood on Bankside and was famous in Elizabethan times, where the works of Shakespeare and his contemporaries were represented. Every kind of dramatic entertainment was produced at the Globe Theatre of 1868, from tragedy to farce. Pinero wrote a comediotta, produced there in 1877, and in the following year were seen J. L. Toole's *Trying a Magistrate*, and another play by H. J. Byron, called *A Fool and His Money*. In the early 'eighties, such well-known writers as Jerome K. Jerome, Sydney Grundy, and Robert Buchanan had productions running. In 1897 Sir John Hare took possession of the theatre, and during his tenancy as many as twelve different plays by well-known authors were produced. *The Three Musketeers* was given in 1898, and the following year Sir A. Pinero's *Guy Lord Quesz*, in which Sir John Hare scored such a success in the title rôle. The G. T. now stands in a fine position in Shaftesbury Avenue, W.C., and its approximate seating capacity is 1000 people. It is one of the largest of the West-end theatres. Among the more recent plays produced are *Fallen Angels*, by Noel Coward (1925), and *Trelawny of the Wells* (1926).

Globigerina, the name given to a genus of foraminiferous rhizopods, whose shells are found in great abundance on the floor of the ocean, particularly in warm seas. They are of a pelagic, limy formation, having many chambers covered with pores,

out of which streams protoplasm. As they die, their shells sink to the bottom and form the calcareous deposit known as the G. ooze.

Globular Projection, a scheme of projection used in cartography as a modification of the orthographic and stereographic projections. In it the eye is supposed to be removed from the surface of the earth, a distance equal to sine 45° of the surrounding circle. It is the method most commonly employed.

Glogau, or **Grossglogau**, a tn. and fortress of Silesia, Prussia, on the l. b. of the R. Oder, 32 m. from Liegnitz. Its cathedral, on an island in the Oder, is connected with the town by a wooden bridge. Fortified since about 1000, it has withstood several sieges. Manufs. sugar, starch, pottery, agricultural machines. Its book-trade is celebrated. Pop. 26,000.

Gloss (Gk. γλῶσσα, tongue, language), or **Glose**. Originally an explanation of merely verbal difficulties in a literary work (such as words taken directly from a foreign tongue, provincialisms, obsolete and technical terms, dialect words, or those used by the author with some exceptional meaning), inserted between the lines or written in the margin beside the passage. The earliest Gs. (Greek, Latin, and Hebrew MSS.) were interlinear, later they became marginal, and finally developed into a running commentary on the whole book. 'Glossai' came to be applied to similar explanatory renderings of words or passages in any dictionary or annotated work, hence our word 'glossary.' In a sinister sense G. may mean a sophistical interpretation. Collections of Gs. ('Glossaria') were very common in the Alexandrian period (fourth century B.C.). Among the chief Greek 'glossatores' are: Philetas of Cos (third century B.C.), Zenodotus, Aristophanes of Byzantium, Aristarchus, Apion, Hesychius of Alexandria (fourth century A.D.), Photius (ninth century), Suidas (tenth century), Zonaras (twelfth century), Favorinus, a Benedictine (d. 1537). Most of the Rabbinical writers have done for the Hebrew text what these did for early Greek texts. The chief glossatores or glossarians of the Latin Vulgate are Walafrid Strabo (ninth century), author of the *Glossa Ordinaria*, and Anselm of Laon (c. 1050-1117), author of the *Glossa Interlinearis*, printed in the Vulgate edition of 1480. A collection of Gs. illustrating the language of scripture was the *Glossæ Sacrae Heysichii* . . . of Ernesti (1785-6). In Roman Law G. means an explanation, not merely

of one word, but of the whole intent of the law. The mediæval commentators on the texts of civil and canon law were called glossatores, the best known being Irnerius (twelfth century), and Accursius (thirteenth century), whose Gs. on the sixth-century Justinian code (*Corpus Juris Glossatum*) ranked almost as high as the code itself. The first glossarium to canon law was that of J. Seneca (Teutonicus), 1212, printed in connection with the *Decretum Gratiani*, 1584. Similar collections were made later of the decretals of Gregory IX., the *Liber Sextus*, the *Clementines*, and the *Extravagantes*. The *Glossarium ad Scriptores Medic et Infimæ Latinitatis* of Du Cange (6 vols.), 1733-6, and Carpentier's *Supplement* (4 vols.), 1766, are very famous. Seven volumes of the *Corpus Glossariorum Latinorum* of G. Goetz appeared between 1888-1907. Gs. on the works of more modern writers are: Tyrwhitt's *Glossary to Chaucer*, 1775; and Nares's *Glossary to Shakespeare and his Contemporaries* (new ed.), 1888. See *Ency. Brit.*; Murray, *New Eng. Dict.*, iv.

Glossop, a manufacturing tn. in Derbyshire, England, near the Peak. Noted for paper mills, cotton and calico printing. Pop. 20,528.

Glottis, see LARYNX.

Gloucester: (1) The cap. of Gloucestershire, England, an inland port, city, and co. bor. of note. It is built on a slight declivity, sloping towards the Severn, and is sheltered by the Cotswold and Malvern Hills. Its principal building is the cathedral, the foundation of which dates from the eleventh century, but which has been restored since 1873. It was at one time a monastery church. G. has several schools, three endowed ancient ones, and several modern. It is governed by a mayor, aldermen, and burgesses. Its chief manufs. are railway engines, agricultural implements, cutlery, etc., and it exports iron, coal, bricks, pottery, salt, malt, and agricultural products, carrying on a large trade with the Baltic and other foreign ports. It also has fine shipbuilding yards, foundries, marble and slate works. The salmon fisheries in the Severn are valuable. G. returns one member to the House of Commons. Pop. 51,500. (2) In Massachusetts, U.S.A., a city and port of entry of Essex co., 32 m. N.E. of Boston. It was founded in 1623, chiefly by settlers from G. in England whence it derived its name. In 1642 it was incorporated as a town, and in 1871 became a city. It is governed by a mayor, elected annually. The oldest Universalist church in the United

States is situated in G., founded in 1770. From the beautiful dark granite quarried in the neighbourhood the Woolworth Building, New York, and some Government Offices are built. G. is noted as being one of the most important fishing ports and markets in the world, 6000 men being engaged in the trade. The principal catches are herring, cod, mackerel, and halibut. G. also has large manufs. of oil, shoes, machinery, cigars, twine, etc. Pop. 24,204, which increases by summer holiday traffic. (3) A city in Camden co., New Jersey, U.S.A., on the Delaware R. It was incorporated in 1868, and is governed by a mayor, elected every two years, and by a unicameral council. It is connected with Philadelphia by ferry. The manufs. include cottons, calico prints, woollen yarns, Welsbach lights, and boats. It has a shipyard, and street railroads, and is lighted electrically. Pop. 13,796.



[L.M.S. Rlp. Photo.]

THE FIFTEENTH-CENTURY TOWER
OF GLOUCESTER CATHEDRAL

Gloucester, Dukes and Earls of. The earldom of Gloucester was first conferred on Robert (d. 1147), who won the Battle of Lincoln for his sister Matilda against Stephen. In the Clare family, Richard (1222-62) was seventh earl, and fought on the side

of the Barons under Henry III., till he finally quarrelled with Simon de Montfort. His son Gilbert (1243-95) was eighth earl, surnamed the 'Red.' He fought with De Montfort at Lewes (1264), but against him at Evesham (1265) for Prince Edward. He was regent during Edward I.'s absence from England. Gilbert, ninth earl (1291-1314), fell at Bannockburn. Thomas of Woodstock (1355-97), youngest son of Edward III., was made Duke of Gloucester by Richard II., 1385. From 1386-9 he was virtual ruler of England. He was put to death at Calais by order of Richard II. on a charge of treason. Humphrey (1391-1447), known as the 'Good Duke Humphrey,' was youngest son of Henry IV., brother of Henry V., with whom he fought at Agincourt (1415). He was Protector during the minority of Henry VI. (see Vicker's *Life*, 1907). Richard, son of the Duke of York and brother of Edward IV., became Richard III. (1483-5). The last but one to bear the title was Frederick William (Duke of Gloucester and Edinburgh, 1776-1834), nephew of George III. The present holder of the title is Henry William Frederick, third son of the reigning King of Great Britain.

Gloucester, Robert of : (1) An early English writer (*fl.* thirteenth century), probably a monk of Gloucester Abbey. He wrote in verse a *History of England* from the earliest times down to the reign of Henry III. (2) An illegitimate son of Henry I., Earl of G. (*d.* 1147), *b.* in Normandy. He was made earl about 1121, and in 1139 headed a rebellion in the W. of England, supporting the claim to the throne of Matilda and her son Henry against that of Stephen. His efforts were unsuccessful. Robert was a great patron of letters. Consult Rössler, *Kaiserin Mathilde*, 1897.

Gloucestershire, a co. of England in the S.W. Midlands, bounded by Worcestershire and Warwickshire on the N., by Oxford on the E., by Wiltshire and Somersetshire on the S., and by Monmouth and Herefordshire on the W. Its area is 1258 sq. m. The county is irregular in outline, but is marked into three distinct physical divisions, viz. the hills, the vale, and the forest. The eastern part of the county lies among the uplands of the Cotswold Hills; the western part overlooks the rich valley of the Lower Severn, known as 'the Vale'; and the beautiful and historic Forest of Dean lies between the Wye and the Severn. The climate of G. is mild, and the greater part of the total area is under cultivation; the vale district is particularly adapted for pasturage, and the moist climate is favourable

to the growth of root crops, wheat being the chief grain raised. The cattle are mostly shorthorns, reared both for distant markets and dairy purposes, G. being famous as a dairy county. It is the vale district which produces the celebrated double Gloucester cheeses, and it has long been celebrated for its cheese and butter. From its orchards large quantities of cider are obtained, the apple and pear orchards attached to nearly every farm are quite a feature of the county. Sheep-farming is carried on largely in the Cotswold district, and this has led to the manufacture of woollen cloth, the kind principally manufactured being broadcloth, made in all shades of colour. The manufactures are both numerous and important, Stroud being the chief centre for a number of manufacturing villages. Machinery, tools, paper, furniture, pottery, and glass are produced. Ironstone, clay, limestone and sandstone are worked, and the Forest of Dean has some iron deposits and important coalfields.

As regards railway communication the county is served by the Great Western and L.M.S. companies; the main line on the Great Western serving Bristol from London. The coalfields of the Forest of Dean are served by several branch lines.

G. is in the Oxford circuit and assizes are held at Gloucester, the county town. It is principally in the diocese of Gloucester, and has five parliamentary divisions. It was first represented in parliament in 1290, when it returned two members. It contains the parliamentary boroughs of Cheltenham and Gloucester and part of the parliamentary bor. of Bristol. (See *Victoria County Histories, Gloucestershire*.) The chief antiquities of the county are the celebrated cathedrals of Gloucester and Bristol, the famous abbey church of Tewkesbury, and the church of Cirencester. Most of the old market towns have fine parish churches, those in Cleve and Cheltenham being of special interest by reason of the pre-Norman work they retain.

As already shown, the physical characteristics of the three natural divisions of G. have given rise to a special industry in each. The forest district was the chief iron-producing area of the kingdom till the sixteenth century, when the Sussex mines were developed, and the mines of G. were worked even in Roman times. The woollen trade of the big towns has been gradually absorbed by the hill district; and in the prosperous Stroud valley silk-weaving was introduced in the seventeenth century. During this century and the next numerous minor industries sprang up, including

flax-growing and the manufacture of lace, rope, sailcloth, stockings, etc. The abundance of clay and building-stone in G., too, has given rise to the manufacture of tiles, bricks, and pottery.

As regards geological formations, no county in England has a greater variety. Gneissic rocks are found at the S. end of the Malvern Hills, and the oldest stratified rocks of the county are to be found in a patch of greenstone at Damoy, Charfield, and Woodford. A series of sandy shales and sandstones is quarried at Dymock, and the Old Red Sandstone occurs in several places in the Bristol coalfield. The Penarth series consists of grey marls and black paper shales, containing much pyrites and a celebrated bone bed, the Cotham landscape marble, and the White Lias limestone. The county has no higher Secondary or Tertiary rocks, but is represented by the Quaternary series. Pop. 750,600. See *Transactions of the Bristol and Gloucestershire Archaeological Society*.

Gloucestershire Regiment. Formerly 28th and 61st Foot. The 28th was raised in 1694, and took part in Marlborough's campaigns, and was at the Battle of Fontenoy (1746). Thence it went to America on service. As 'The Old Braggs' and 'The Slashers' it gained great renown in the eighteenth century. At Alexandria in 1801 it gained the unique distinction of being permitted to wear a badge at the back of the head-dresses as well as in the front. This was in commemoration of the fact that it was attacked by Napoleon's Invincible Legion both in the front and the rear but defeated the Legion with great loss. A few years later it was with Wellington in the Peninsula and at Waterloo. The 61st was raised in 1755, and saw service in the W. Indies, Malda, Peninsula and the Indian Mutiny. These two regiments were linked in 1881 to form the Gloucestershire Regiment, which fought in the S. Africa War, 1899-1902. During the Great War it raised twenty-four battalions, which served in France, Flanders, Italy, Macedonia, Gallipoli, Egypt, Mesopotamia and Persia.

Glove (Old Eng. *glof*), a covering for the hand, usually with a separate sheath for each finger. The use of Gs. was apparently known in the earliest times, and references are made to it in classical history. In the eighth and ninth centuries the use of Gs. was almost universal among the Germans and Scandinavians, though usually of the fingerless kind; but there is no evidence to prove that Gs. were in use in England till the thir-

teenth century. They were then first worn by ladies as ornaments, sometimes being made of linen and reaching almost to the shoulder. It was Queen Elizabeth who set the fashion of wearing them richly embroidered and bejewelled. During the Middle Ages the G. obtained a special significance in the symbolic sense, the custom of offering a folded G. as a gage for wagering one's law coming into use. Associated with this custom was the use of the G. in a wager of battle, when it was thrown down by the defendant and picked up by the accuser, in open court, signifying a challenge and its acceptance. The manufacture of Gs. was not introduced into Great Britain till the tenth or eleventh century. A speciality of the English manufacture



CEREMONIAL GLOVES USED BY
KING LOUIS XIII. OF FRANCE

is the so-called 'dog-skin' G., made from the skin of the Cape sheep. The chief seat of the leather-glove manufacture is at Worcester, though they are also made to a considerable extent at Ludlow, Yeovil, and Woodstock, and they are distinguished for their durability. An immense number of Gs., especially of the kid variety, are made in France, where they are noted for their elegance and neatness. Danish ladies' Gs. are also famous. The manufacture is also carried on in Brussels and Berlin; and in the U.S.A. many grades and varieties are made in the large manufactories.

Glover, Richard (1712-85), an English poet, son of a London merchant, educated at Cheam, Surrey. He was M.P. for Weymouth, 1762-8. He wrote some verses in praise of Sir I. Newton (1728), and his blank verse epic, *Leonidas*, appeared in 1737 (extended to 12 vols. by 1770). The *Athenaid* (a sequel, 30 vols.) was published posthumously in 1788. His

works are mostly forgotten now. Others were the tragedies *Boadicea*, 1753; *Medea*, 1761; *Jason*, 1799; and the *Ballad of Admiral Hosier's Ghost*, 1726, intended to excite the English against Spain. G.'s diary was published in 1813. See Chalmers, *Works of the English Poets* (vol. xvii.), 1810; *Retrospective Review* (vol. ii.), 1820.

Gloversville, a city of Fulton co., New York state, U.S.A., 43 m. N.W. of Albany. Noted for the manufacture of gloves and mittens and glove and shoe leather. Pop. 23,099.

Glow-worm, a name applied to various luminous beetles of the subfamily Lampyridæ. There are about 500 species. They are nocturnal in habit, and found chiefly in warm countries. The phosphorescent structure is on the abdomen, and the lights apparently serve as love-signals between the sexes, to light the path of the beetle and frighten off foes. The most common European variety is the *Lampyrus noctiluca*. The female is usually wingless; the males, eggs, larvæ, and pupæ are all luminous. In this variety alone the female's light is more brilliant than the male's. Other species are *Lampyrus splendida*, the W. Indian *Photuris* and *Pygolampis*, American *Pyractomena*, *Pyrocellia*, *Luciola*, *Lamprocera*, and *Photuris pyralis*. Consult works of Gosse (1810-88); Prof. Emery (b. 1848); Holder, *Living Lights*, 1887. See FIREFLY and PHOSPHORESCENCE.

Glucinum, see BERYLLIUM.

Gluck, Christopher Willibald (1714-87), an operatic composer, may be credited with having rescued opera from the degeneracy to which it had sunk under the influence of the early eighteenth-century Italian school, who wrote purely for the display of vocal technique—thereby preparing the way for its subsequent development by Wagner. G. was the first composer to study the deeper æsthetic possibilities of opera as an art-form; his ideals, like those of his successor and archetype Wagner, were framed on the lines of the Greek drama, and aimed at making music the expression of sincere passions and profound sentiments. The music of his 'reformed' operas is an application of these ideals; it is subservient to the libretto, and psychological in a manner that would now be deemed superficial, although at the time it was an unheard-of innovation; and the orchestration represents with noble breadth and dignity of style and austere simplicity of colouring the emotional degrees of the poetry. Further, the overtures are synoptic programmes of the operas. G.'s early efforts were all in the Italian style, *Artaxerxes* being the first of a

very successful series in Milan, Venice, and Turin (1741-45). He then came to England, but was overshadowed by Handel who was then at the zenith of his popularity, and failed to win recognition. It was in Vienna that his first significant opera, *Orfeo* (1764), was produced, meeting with great and immediate success. In this work, which may be regarded as the germ of the modern music-drama, are seen the more or less tentative ideas which found maturer expression in *Alceste* (1769), *Iphigénie* (1774), *Armida* (1777), *Iphigénie in Tauris* (1779), this latter being the weapon which gave G. the victory over Piccini, the rival composer of the Italian school, in the quarrel incited between them by the Paris courtiers under Marie Antoinette and Madame du Barry respectively—and finally *Echo et Narcisse* (1779).

Glucose, see DEXTROSE.

Glue (Old Fr. *glu*, bird-lime), an impure gelatine which is used for its adhesive properties. It is made from the refuse of tanneries, such as parings of hides, ears and tails of oxen and sheep, and from the skins of calves, cats, dogs, rabbits, hares, and other animals, though oxen and sheep are preferred. The hide is washed in tanks of lime water or soda solution for two or three weeks until the hair is removed. The gelatinous substance is obtained by melting the hide in an open boiler. The glue-stock is then boiled in water, the quality of the G. depending on the amount of water used. Any stock left after the contents of the boiler have been passed through a clarifying vat is re-boiled with a fresh quantity of water to make an inferior quality of G. The gelatinous fluid is placed in wooden congealing boxes until it is solidified into a firm jelly, when it is removed, cut up into slices by a wire or a wet knife, and dried in the open-air on netting stretched over frames. The cakes should be carefully watched, as changes in the weather may bring about partial or total decomposition of the G. The drying is finished indoors by currents of air. The cakes are re-dipped in water and allowed to dry again, which gives them a bright, polished appearance. A very fine quality of G. is made in Scotland. There are various other kinds of G., e.g. bone G., made from bones, fresh or boiled, and fish G., made from the skins of fish. Marine G. is a cementing composition, made of a solution of india-rubber and coal-tar naphtha, powdered with shellac. It is often used instead of tar.

Gluten, one of the most important constituents of wheat flour, is ob-

tained from it by kneading a paste of the flour under water in a linen bag, until no further milkiness is produced. The grey, tenacious, tasteless substance remaining consists mainly of G., which may be separated into vegetable fibrin, which is soluble, and gliadin, which is insoluble in alcohol. Oats, rye, and barley scarcely contain any G., whereas the proportion in wheat varies from 10 per cent. in cold to 15 per cent. in hot climates. It has a high food value, and contains from 15 to 18 per cent. of nitrogen in addition to carbon, hydrogen, oxygen, and sulphur. G. plays an important part in the manufacture of bread by preventing the escape of carbon dioxide from the dough, thus rendering wheaten bread lighter than that prepared from rye and other flours.

Glutton, or Wolverine (*Gulo luscus*), the former name is somewhat of a misnomer, since the animal is no greedier than are the other species of the same genus. It belongs to the weasel family and has most of the characteristics of that family. It resembles somewhat the European



GLUTTON

badger, being from 2 to 3 ft. long, plus a bushy tail of about 8 in. It has blackish-brown fur, with a broad band of chestnut fur running along each side of it. It exists in both hemispheres, but is found principally in the Arctic regions of N. America, especially in Alaska and round the Mackenzie R. The flesh is useless, but the furs are made into hearth- and carriage-rugs.

Glycas, Michael, a Byzantine historian. The date of his birth and the period during which he wrote are very obscure, but he was noted amongst the historians of the Eastern empire for the terseness and clarity of his style. Some letters which are supposed to have been written by him to Constantine still exist, though their authorship is dubious. His best known work is *Βίβλος Χρονική*, which treats of the history of the world from the creation to the death of Alexius I., Comnenus.

Glycerine, more correctly called **Glycerol**, or, in chemical terminology, **Trihydroxypropane** ($C_3H_5(OH)_3$), is an essential component of the fats and

oils of both vegetable and animal origin. These fats and oils are mixtures of the glyceryl esters of the fatty acids, and on treatment with hydrolysing agents (e.g. alkalis, superheated steam, etc.) they are split into either G. and the alkali salt of the acids, or G. and the free fatty acids. A similar decomposition is effected in the intestine, the G. and fatty acids being absorbed separately and again reconverted into fats. The principal sources of G. are stearin (the main constituent of the harder fats such as beef and mutton tallow), palmitin, present in palm oil and other oils, and olein, which is found in the soft fats and oils, including lard. G. is prepared almost entirely as a by-product in soap manufacture. The fat is treated with alkalis, and the soap (i.e. the alkali salt of the fatty acid) is salted out; in the residual lye is found all or most of the G. present in the original substance. This lye is filtered from impurities, concentrated *in vacuo*, and then distilled under reduced pressure. Chemically pure G. is obtained by diluting the crude product with water and removing by distillation the acid products that pass over at 100–110° C. The temperature is gradually raised to 170° when the G. distils over. G. is a colourless, viscid liquid with a sweet taste which crystallises at low temperatures. Specific gravity 1.1320, boiling point 290° with decomposition. On rapid heating it loses water with the formation of acrolein. G. is used in enormous quantities for the preparation of nitro-glycerine and explosives related to the latter, e.g. dynamite. It is also employed to a large extent in dyeing, calico-printing and dressing, in the manufacture of leather, and in pharmacy and medicine generally. Because of its non-drying and antiseptic properties it is used as a lubricant for watches, etc., and since it does not freeze when mixed with water it forms a valuable filling for gas meters and motor-car radiators.

Glycocoll, or **Glycine**, is aminoacetic acid (CH_2NH_2COOH), a sweet, crystalline body (melting point 232° C.), and was first obtained from the products of the action of sulphuric acid on glue, but is more conveniently prepared by the action of ammonia on monochloroacetic acid. It forms compounds with both acids and bases.

Glycogen, or **Animal Starch**, ($C_6H_{10}O_5$)_n, discovered by Bernard in 1857, is found in the livers of animals, where it is probably stored as a reserve material. It is a white tasteless powder, giving a red colour with iodine, and is converted by ferments into maltose, and by acids into

glucose. *Pâté de foie gras* and oysters contain a considerable amount of G.

Glycol, or **Ethylene Alcohol** ($\text{CH}_2\text{OH}\cdot\text{CH}_2\text{OH}$), the first and best known of the series of dihydric aliphatic alcohols. It is prepared from ethylene dibromide by boiling with potassium carbonate solution, and is a sweet, syrupy hygroscopic liquid, boiling at 197°C ., and freezing to a crystalline solid at -17°C . It is used in the manufacture of high explosives.

Glycon of Athens, a Greek sculptor of uncertain period, famous for the colossal statue of the Farnese Hercules found in the baths of Caracalla in 1540, with the inscription 'Glycon the Athenian made it,' engraved on the rock supporting it. The statue was probably executed in the first or second century of the Roman empire.

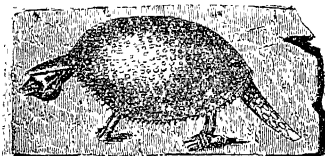
Glycosmis, the name of a genus of rutaceous plants indigenous to the tropics. It contains six species, of which *G. citrifolia*, the Jamaica orange, is the best known.

Glycosuria. The literal definition of this word is sweet urine, and it is used to designate a state in which chemical tests show sugar to be present in the urine. G. is of common occurrence, and may be due to excessive consumption of sugar or inability of the individual to utilise the sugar and starch in food. It is often associated with mental trouble, disease of the brain, liver or kidney. The severity of G. is estimated by the amount of sugar excreted, and the presence or absence of increased thirst. The condition is not infrequently found on examination and should be looked upon as an indication of the necessity of regulating the diet. This should be done by diminishing the amount of articles of diet containing sugar and starch, that is flour and generally vegetables grown underground. Saccharine should be taken instead of sugar in beverages, such as tea and coffee, and other articles of diet. The significance of G. consists in the fact that it may be an early symptom of the disease known as diabetes.

Glyncorwg, an urban dist. of Glamorganshire, situated 8 m. W.S.W. of Aberdare. It has coal and iron mines. Pop. about 10,000.

Glyptodon (Gk. *γλυπτός*, carved, and *ὄδους*, tooth), the name of a genus of fossil Dasypodidæ or armadillos, found in the post-tertiary deposits of S. America. They are characterised by their great size and by thick, solid carapaces, which in some cases are nearly 6 ft. long; the head is sheathed in bony plates, so also is the long tail. *G. clavipes* and

G. reticulatus are the best-known species.



FOSSIL OF *GLYPTODON CLAVIPES*

Gmelin, the name of a distinguished family of German scientists:

Johann Georg Gmelin (1709–55), scientist and traveller, b. in Tübingen. In 1731 he was made professor of natural chemistry and history at St. Petersburg, and in 1733 he undertook a journey to Siberia. In 1749 he was appointed professor of botany and chemistry at Tübingen. He published *Flora Sibirica*, 1747–9, and *Reise durch Sibirien* in 1751–52.

Samuel Gottlieb Gmelin (1744–74), a nephew of Johann Georg G., b. at Tübingen, and appointed professor of botany in St. Petersburg in 1767. He travelled in S. Russia to study botany, and wrote *Historia Fucorum* in 1768.

Johann Friedrich Gmelin (1748–1804), a nephew of Johann Georg G., who published a botanical dictionary entitled *Onomatologia Botanica Completa*, 1771–7.

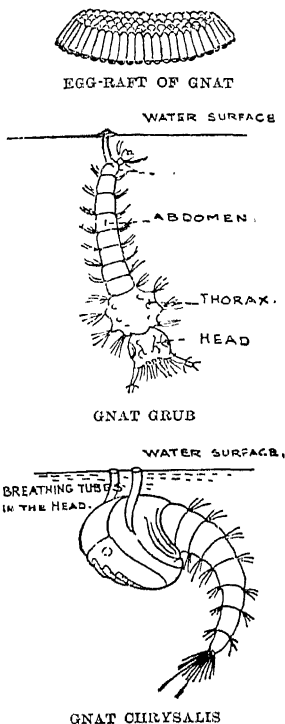
Leopold Gmelin (1788–1853), chemist, son of Johann Friedrich, b. at Göttingen. He studied medicine at Göttingen and Tübingen, and taught chemistry at Heidelberg for four years, after which he was made professor of medicine and chemistry at Heidelberg, 1817–51. He wrote many scientific works, amongst which is *Handbuch der Chemie*, 1817–19; this was translated into English, 1848.

Christian Gottlob Gmelin (1792–1860), a nephew of Samuel Gottlieb, was professor of chemistry in the University of Tübingen, and was also the discoverer of an artificial process for the manufacture of ultramarine.

Gmünd, a tn. of Germany in Württemberg. It is situated on the Rems, 28 m. N.E. of Stuttgart. The manufs. are woollens and cottons, jewellery, trinkets, etc. Hops and fruit are grown in the neighbourhood. There is a noted pilgrimage chapel in the vicinity. Pop. 20,400.

Gnat, a genus of small dipterous flies of the family Culicidæ, very common in marshy districts. There are nine British species, the *Culex pipiens* being the common G. Mosquitoes are included in the family,

but are larger in size and bite more effectively.



'Gneisenau.' One of the five German cruisers of Admiral von Spee's squadron at the Battle of Coronel (*q.v.*).

Gneisenau, August Wilhelm Anton, Graf Neithardt von (1760-1831), a Prussian general, *b.* at Schildau, near Torgau, in Prussian Saxony. After studying for two years (1777-79) at the Erfurt University, he joined an Austrian regiment. In 1782-86 he fought among the German auxiliary troops on the side of England in the American War of Independence. On his return, he became a lieutenant in the Prussian infantry, and served in Poland (1793-94). He fought at Smolensk and at Jena in 1806, and defended Colberg in the following year. His gallantry was formally recognised, and he received the order *pour le mérite*. During the War of Liberation, he fought with distinction at Leipzig in 1813, and

still further increased his military reputation on Blücher's staff during the Waterloo campaign of 1815. In 1831 he was appointed a field-marshal of the Prussian army and put down the rebellion in Poland, but he fell a victim to cholera and *d.* at Posen in August of that year.

Gneiss, the name given to a family of metamorphic rocks which contain essentially the same mineral elements as granite, that is, felspar, quartz, and mica, but differ in the foliated arrangement of their constituents. The minerals alternate in light and dark layers, which are sometimes so distinct as to give the appearance of stratification. There are many varieties of forms, from the true granite to the schistose condition; in *hornblende gneiss* hornblende takes the place of, or is associated with, mica; in *graphite gneiss*, it is graphite that takes the place of mica. In some varieties, the felspar occurs in large distinct crystals, or kernel-like masses forming *porphyritic gneiss*. Some Gs. are undoubtedly of eruptive origin and others have resulted from the metamorphism of sediments; they are the most widely-distributed of metamorphic rocks and are found in almost all parts of the world.

Gneist, Heinrich Rudolf Hermann Friedrich von (1816-95), a German jurist, *b.* in Berlin. He studied at Berlin University, where he took his degree of *doctor juris* in 1838. In 1841 he was appointed assessor to the Kammergericht, or supreme court, and rose to be an assistant judge. In 1844 he became extraordinary professor of Roman law at Berlin, and retired from his judicial life in 1850 in order to devote himself to teaching and to politics. He sat in the Prussian Lower House among the National Liberals, and from 1858 to 1893 sat in the Abgeordnetenhaus, or House of Deputies of the Prussian Landtag. He wrote voluminously on political subjects and on constitutional law. His works, many of which have been translated into English, include: *Die formellen Verträge des heutigen römischen Obligationen-Rechts*, 1845; *Adel und Ritterschaft in England*, 1853; *Das heutige englische Verfassungs- und Verwaltungsrecht*, 1857-63; *Budget und Gesetz nach dem constitutionellen Staatsrecht Englands*, 1867; *Zur Verwaltungsreform in Preussen*, 1880; *Englische Verfassungsgeschichte*, 1882; *Das englische Parlament*, 1889; and *Die verfassungsmässige Stellung des preussischen Gesamtministeriums*, 1895. See life by Otto Gierke, 1895.

Gnesen (Polish *Gniezno*), a tn. in the prov. of Posen, Prussia. It has a fine Catholic Cathedral in the Gothic

style, dating from 965, in which the Polish kings were crowned till 1320. It was rebuilt in 1760-90. The town numbers among its industries linen and cloth weaving, brewing, and distilling. The archiepiscopal see was founded by the emperor Otto III. in 1000. The town came under the rule of Prussia in 1815. (Came under independent Polish government by peace treaty, 1919. Pop. 26,000.)

Gnomes (Fr. *gnomes*, Ger. *Gnommen*), in folk-lore, are spirits of the earth and mountain, who are supposed to conceal treasure in their subterranean dwellings. The word is supposed to have originated with Paracelsus, who uses it as synonymous with *Pygmæi*, and derives it from Greek *γνώμη*, intelligence. They are of both sexes. The male G. is generally represented as a tiny, semi-deformed, bearded creature, clothed in a tight-brown tunic with a peaky hood. They are impish and mischievous, but not malignant sprites. It is probable that the fanciful idea of Gs. really originated among Teutonic tribes of normal stature with regard to some dwarfish neighbours. The aborigines of Transylvania were a swarthy race, largely inhabiting caves, and the suggestion is that they may have given rise to the imaginative superstitions with regard to Gs. and such fairies. The Transylvanian gypsies fear an 'earthman' whom they call *phuvush*, and who is supposed to steal unbaptised children.

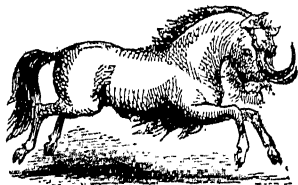
Gnome (Gk. *γνώμη*, an opinion), a maxim or proverb. The Gnostic poets of Greece (*γνωμικοί*) flourished in the sixth century B.C.; wrote sententious and pithy maxims in the elegiac distich, and included among their number Theognis of Megara, Solon, Simonides of Amorgos, Xenophanes, and Euanes. The Gnostic spirit is prevalent in a great deal of Oriental literature, and was popular among the early Germanic peoples. A fair number of Old Eng. proverbial sayings, strung somewhat inconsequently together, may be found in the Exeter Book and in the Cambridge Cotton MS. and are known as 'Gnostic Verses.' Francis Quarles (1592-1644), who directly imitated the Gk. Gnostic writers in his *Quatrains* (published 1574), is one of the latest writers to use this particular form.

Gnosticism (Gk. *γνώσις*, knowledge), a widespread spiritual but heretical movement which existed during the first three centuries. The Gnostics interpreted the word *γνώσις* to mean 'revelation,' and believed that they possessed a secret knowledge of the mysteries of God, distinct from *σοφία*, or practical, religious 'wisdom' of the Christian. They claimed that they

had received their revelation by a secret tradition, through the disciples, from Jesus Christ Himself, and jealously guarded their knowledge from the uninitiated. They set aside the realistic eschatology of the early Christian Church. As in so many mystic religions, G. is individualistic. The ultimate object was the salvation of the human soul, redeemed from matter by religious knowledge, and not, as in Christian doctrine, by the death of the Saviour. Sacraments of water, fire, food, etc., formed a significant part of the religion. Their teaching was an amalgamation of diverse Gk. and Oriental philosophies. The Divine Demiurgus, the Creator of the world and the Law-Giver of the O.T. was distinguished from God, the Supreme Being. They believed that all things emanated from the Divine First Cause; that God is separated from man by a hierarchy of æons and by companies of demons and deities, the highest duty of man being to unite himself with the First Source of Spirit through gnosis. The soul, on its passage to God, must overcome the intervening gulf by means of secret formulas and symbols. (See Anz, *Ursprung des Gnosticismus, Texte und Untersuchungen*, xv. 4.) They distinguished Jesus Christ, as the final and perfect Æon between man and God, from the visible manifestation of Himself on earth. His life was regarded as a real human life, with which He deliberately associated Himself, or as a 'psychical' creation. The Gnostics divided men into three grades, the *Pneumatic* (*πνευματικοί*), or 'spiritual'; the *Psychic* (*ψυχικοί*), or 'soulish'; and the *Hylic* or 'material' (*σωματικοί*), which last are doomed to perish. They laid great stress on the asceticism, or denial of the sensuous world, among early Christians, which with them was developed into extremes of self-abnegation or of libertinism, the latter being advocated by the Marcosians and Carpocratians. Misunderstanding of Christian theology is to be seen in this teaching. In 1 Cor. xii. 8, and xiii. 2, St. Paul places 'knowledge' among the spiritual gifts and distinguishes it from 'wisdom' (*σοφία*), to which he refers in 1 Cor. ii. 6, 7. Simon Magus (Acts viii. 9-24) is said by anc. writers to be the progenitor of G. There is a warning in 1 Tim. vi. 20 against a 'false' knowledge, and it has been suggested that this passage refers to some kind of Gnostic speculation which was troubling the early Christians. The only complete Gnostic work that has come down to us is the *Pistis Sophia*, an Egyptian work of the third century, an edition of which was published by Schwartz and

Petermann in 1853. Fragments exist of the works of Bardesanes, a Syrian poet (fl. A.D. 220), and there are certain Gnostic Acts, bearing the names of Peter, John, Andrew, and Thomas. Tatian's *Diatessaron* was used as late as the fifth century in the Syrian Church. The works of the Gnostics, Basilides (*Exegetica* and, perhaps, a *Gospel of Truth*) and Valentinus (*Psalms, Homilies, and Letters*) have been lost. The chief authorities on G. are Justin, Irenæus, Tertullian, and Epiphanius. Consult Neander, *Genetische Entwicklung der vornehmsten Gnostischen Systeme*, 1818; Matter, *Histoire critique du Gnosticisme* (2 vols.), 2nd ed. 1843; King, *The Gnostics and their Remains*, 1887; Mansel, *The Gnostic Heresies of the First and Second Centuries*, 1875; Hilgenfeld, *Die Ketzergeschichte des Urchristenthums*, 1884, with the Gnostic fragments; and Mead's translation of *Pistris Sophia* (London), 1896. The chief attacks upon G. have been collected by Coxo in *Anti-Nicene Fathers* (10 vols.), 1885-96.

Gnu, or **Wildebeest** (*Catoblepas*, or *Connochates Gnu*), the name of two species of antelope. The S. African G. is black in colour with a white tail, and presents a curious mixture of a buffalo, antelope, and horse. Both sexes have horns, which are cylindri-



ANTELOPE GNU

cal and curve upwards. The brindled G. or blue wildebeest (*Connochates taurinus* or *Catoblepas gorgon*) occurs in Bechuanaland, where it is called *kokon*. The G. is a fast runner and in its wild state is very fierce, but may be tamed to do the work of oxen if captured when young.

Goa: (1) G. territory, a Portuguese settlement on the W. coast of India. Area, 1400 sq. m. It consists of Goa, containing the capital Pangim, or Nova-Goa, on the Malabar Coast; Damão, on the coast about 100 m. N. of Bombay and Diu, a small island about 140 m. W. of Damão. It is divided into two portions known as the Velhas Conquistas (Old Conquests, taken early in the sixteenth century) and the Novas Conquistas (New Conquests). It is a hilly region,

some of the peaks of the W. Ghats rising to 4000 ft. The country is intersected by many short, but navigable, rivers, the largest being the Mandair and the Juari. One of the chief industries is agriculture: mangoes, bananas, cocoanuts, arca nuts, palm, and spices being among its products. There are a number of salt works both at G. and Damão and manganese deposits were found in 1906. The chief exports are cocoanuts, fish, spice, salt and copra. The harbour is good and a breakwater and quay have been added recently. It is connected by rail with British India. The province is ruled by a governor-general, assisted by a general council and three subordinate councils. Pop. about 516,000. (2) A tn. founded by Albuquerque in 1511 on the island of G. It is famous for its beautiful examples of Portuguese architecture. Among its buildings are a majestic cathedral, the Church of Dom Jesus (1594-1603), a perfect example of Renaissance style, containing the tomb of St. Francis Xavier, and the Chapel of St. Catherine (1551). New G., also called Panjim or Pangim, was a suburb of the old city. It was made the capital of Portuguese India in 1843. Pop. 7500.

Goalanda, a market tn. of the Bengal Presidency, British India, situated at the confluence of the Ganges and the Brahmaputra. It is the terminus of the Eastern Bengal Railway, and has a busy river trade. There are important engineering works. Pop. (estimated) 11,000.

Goalpara, dist. in W. Assam. Fertile but hot and unhealthy. Cap. G., on the Brahmaputra, 85 m. E.N.E. of Itanagar. Pop. about 5000.

Goat (connected with Lat. *hædus*, a kid). Gs. are a genus of ruminant quadrupeds, forming, with sheep, the 'caprine' (Lat. *capræ*, goat) section of the Bovidae family. They are very closely allied to sheep, but distinguished by horns in both sexes (usually more pronounced in the male). These horns are generally long, and directed upward, outward, and backward, while those of sheep are shorter and mostly spirally twisted. Male Gs. have beards, and a strong offensive smell, especially during the rutting season. Gs. have shorter tails than sheep and are marked by the absence of the small pit between the toes of the hind-feet. In habits they are much bolder and more curious than sheep and do not blindly follow the flock. (The term 'capricious' is derived from Gs.) Gs. belong entirely to the Old World. They are essentially mountain-loving animals, and sure-footed, nimble climbers. They are chiefly found in

the mountain regions of Europe and Asia. Two species exist in N. Africa, and one in S. India, but they are not commonly found below the Hima-

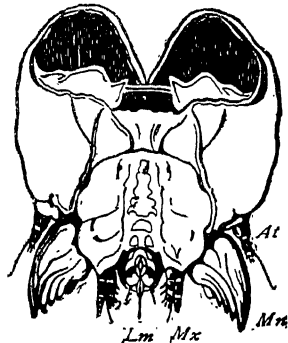


TIBET GOAT (OR CASHMERE GOAT)

layas. Remains discovered in the Indian Pliocene deposits include those of a hornless kind—the *Bucapra daviesii*. They feed chiefly on the shoots and leaves of shrubs and trees, and not so much on grass as sheep do. The herds are usually small. Autumn is the breeding season, and the kids are produced in the spring, commonly two at a birth. There are numerous varieties of the wild G. (*Capra hircus*), including the ibex of the Alps, Himalayas, and Arabia; the Bezoar G. or Paseng (pasang), probably the parent of the common domestic G.; the Tur of the Caucasus; the Markhor of the Himalayas; the Spanish G.; and the Thar or Goat-antelope (*Hemitragus*). The Paseng (*Capra aegagrus*) is the wild G. mentioned by Homer in connection with Crete and the Cyclops. Gs. are chiefly useful for their milk, from which cheese is often made. From three to six pints a day are usually yielded, but the Nubian G. yields far more. Their hides make good leather and are sometimes used for kid gloves. Of the domesticated breeds the most famous are the Angora and the Kashmir. The former have long, silky hair next to the skin and an outer covering much resembling wool. The latter have a coat of woolly texture next the skin and the long, silky hair-covering outside. From this are made the true Kashmir or 'camel's hair' shawls. The two chief varieties of Kashmir Gs. (var. *laniger*) are the 'chappoo' and the more common 'changra.' They abound chiefly in Tibet and Bokhara. The Angora breed has been introduced into Cape Colony (c. 1864), Australia, and U.S.A.

The Mamber G. from Asia Minor and Tartary, distinguished by its drooping ears, is used for similar purposes. The short-haired varieties are usually white, grey, fawn, or black in colour, sometimes they are pied. Consult Schreiner, *The Angora Goat*, 1898; Lydekker, *Royal Natural History*, ii., 1896; Blanford, *Fauna of India: Mammals*, 1888-89; Danford, 'Notes on the Wild Goat' in *Proc. of the Zoological Soc. of London*, 1875; Pegler, *Book of the Goat* (4th ed.) 1910.

Goat-Moth (*Cossus ligniperda*), a large moth, measuring about 3 in. across the wings, common in Europe and W. Asia. It is yellowish-grey or brown in colour, with irregular markings of white and black on the upper wings. The pupa is enclosed in a tough cocoon of chips, from which the moth emerges. When the moth is frightened it emits a disagreeable odour like that of a he-goat, whence its name.



HEAD OF GOAT-MOTH CATERPILLAR (*COSSUS*) FROM BEHIND (magnified)

At, feeler; *Mn*, mandible; *Mx*, 1st maxilla; *Lm*, 2nd maxilla with spinneret.

Goatsucker, the name given to *Caprimulgus europæus*, the common nightjar, a picarian bird belonging to the family Caprimulgidae. It is so called because of an ant. and widespread belief that it sucks the milk of goats and other animals, infecting them with disease; this tradition probably originated from the nightjar's habit of seeking insects on pasture-grounds. Other names for this bird are fern-owl, dor-hawk, and night-hawk. It is common in the British Isles during the middle of summer, and is found in various parts of Europe, Asia, and America.

Gobelin, the name of a noted Fr. family of dyers. Gilles and Jean G.

established dyeworks at Faubourg St. Marcel, on the Bièvre, about the middle of the fifteenth century. The business flourished, and before long a tapestry manufactory was added to the establishment. The beautiful tapestries produced by this firm became celebrated and in 1662 the works were purchased by Colbert for Louis XVI. Le Brun and other famous painters executed the designs for the royal tapestries. The looms were not worked during the Revolution, but towards the end of the nineteenth century a fresh impetus was given to the industry, and a second state-supported establishment was opened at Beauvais. Consult Gerspach, *La Manufacture Nationale des Gobelins*, 1892.

Gobi, Desert of (Mongolian, 'desert'), an enormous desert region of China, Central Asia, its exact limits being still somewhat undefined. The Chinese call it Shamo, Shaho (sea or river of sand), or Han-Hai. It stretches from the Pamirs to the Khingian Mts., which separate it from Manchuria on the E., China proper bounds it on the S., and Mongolia on the N. The W. part between the Yarkand Daria (Tarim) and Lob-Nor is called the Takla Makan Desert, and E. of Lob-Nor comes the 'Great' Gobi. Other parts with special names are the Ordos Gobi (N. loop of Hwang-ho), Galbun Gobi (N.W. of Ordos), Alashan or Lian Gobi (W. of Ordos), Gashiun Gobi (W. of oases from Ngansi-chou to Barkul). The surface is in some parts composed of masses of loamy, coarse, shifting sands in others of rocky masses and mountain heights. The great plateau is from 3000 to 5000 ft. high. In the W. there is some vegetation, and regular caravan-routes cross the desert, the chief being that between Kiakhta and Peking, via Urga and Kalgan. Nomad Buddhist tribes live in the interior, but all permanent settlements are towards the N. Remains of buried habitations and towns have been found in the sandy parts. The streams appear to have no outlet to the sea, the most important being the Tarim. The total area is about 300,000 sq. m., average breadth 400 m. Information has been obtained from the explorations of Ney Elias, Przhevalski (Prjevalski), Kozlov, Grun-Grijmailo, Robovrosky, Bogdanovich, Pievstov, Dr. Sven Hedin, and Dr. Stein. Early explorers were Marco Polo (1254-1324), Gerbillon the Jesuit (seventeenth century), the Spaniard Ysbrand Ides (seventeenth century), and Lorenz Lange (eighteenth century). See Przhevalski, *From Kulja across the Tian-shan to Lop-nor* (trans. by Delmar Morgan,

1879); *Mongolia* (trans. 1876); works of Younghusband, 1896, and Sven Hedin, 1899-1902.

Gobineau, Arthur de (1816-82), Fr. diplomatist and writer, b. at Ville-d'Avray, d. at Turin. Son of a retired officer. Worked for a time, first with a Paris gas company and then with the Post Office department. Then wrote for Parisian journals, attracting the attention of de Tocqueville who, as Foreign Minister, made G. chief of his secretariat. From 1849 G. filled various posts in the diplomatic service in Berne, Persia, Greece, Brazil and Sweden, but retired in 1876 embittered because none of the great prizes in the service had fallen to him. His fame rests on his writings. For years he was unread in his own country while in Germany he was the subject of an ardent cult. Latterly, his fame has been steadily growing in France and many of his books have been translated into English and issued in Great Britain and the U.S.A. He wrote a history of the Persians and an account of the tenets of Babism (see BABI); also a long poem *Amadis* and some novels, including *Scaramouche* and *L'Abbaye de Typhaines*. Some of his best writing is to be found in his *Souvenirs de Voyage* and *Nouvelles Asiatiques*, books of exotic short stories. Probably his masterpiece is *La Renaissance*, a series of dialogues in which the masters of the Italian renaissance discuss art, letters, statesmanship and life's lessons. But the work which gave him his chief vogue in Germany is his pseudo-scientific book extolling the Nordic races, entitled *The Inequality of Human Races*. This won him the friendship of Wagner and Nietzsche and profoundly influenced both men. Through his literary descendants, G. was one of the founders of the pan-German school of the early twentieth century. His work has had its echo in the U.S.A., where a school of pseudo-scientific writers have written volumes the whole tendency of which is similarly to extol the 'Nordics' at the expense of their fellow citizens of Jewish or southern European blood. In keeping with his theories was his best-known novel, *Les Pleiades*.

Goblin (Fr. *gobelin*; Low Lat. *cobalus*), a friendly but mischievous and impish sprite; corresponding to the Ger. *Kobold*, a domestic fairy. It is also called *hobgoblin*, and is supposed to haunt dark corners, for which reason it is used to frighten children.

Goch, a tn. of Germany, in the Prussian Rhine prov., 8 m. S. of

Cleves. During the Middle Ages it was noted for its linen; its chief manufactures now are brushes, plush, cigars, and margarine. Pop. about 11,000.

God, see DEISM.

Godalming, a municipal bor. in the Guildford parl. division of Surrey, England, on the Southern Railway, and on the r. b. of the Wey. The famous public school of Charterhouse, founded in 1611, was transferred from London to G. in 1872. The manufs. of the tn. include paper, hosiery, and leather. Pop. 9193.

Godard, Benjamin Louis Paul (1849-95), a Fr. composer, b. in Paris. He studied at the Conservatoire, and shared with M. Théodore Dubois the prize of the Paris musical competition of 1878 with his dramatic cantata *Le Tasse*. He composed a number of popular songs, such as *Chanson de Florian*, *Ninon*, *Je ne veux pas d'autres choses*; four operas, *Pedro de Lamea* (1884), *Jocelyn* (1888), *Dante* (1890), *La Vivandière* (left unfinished); the *Symphonie légendaire*, and the *Symphonie gothique*, and a large quantity of piano and violin pieces and various orchestral works. He d. at Cannes.

Godavari: (1) A dist. of British India in the Madras Presidency. In 1907-08 it was transferred to Kistna district, its present area being 5634 sq. m. It is watered by the Godavari R. and its tributary, the Sabari, and across the N.E. portion of the district lies a range of the Eastern Ghats. The timber from the forests is of great value and graphite is mined. The cigars known as Lunkas are manufactured from tobacco grown on the *lunkas* or islands of the R. Godavari. Sugar, oil-seeds, and rice are also cultivated. The chief town is Cocanada, the old capital being Rajahmundry. The main line of the E. Coast Railway traverses the district, a branch running to Cocanada. Pop. 1,500,000. (2) A riv. rising 50 m. from the Indian Ocean, and, flowing across the Deccan from the W. to the E. Ghats, empties itself into the Bay of Bengal. Its total length is 900 m. It is regarded as a sacred river and the festival of Pushkaram takes place on its banks at Rajahmundry once in twelve years. A dam has recently been constructed by Sir Arthur Cotton at Dowlaishweram, from which 3 main canals are drawn off. By this means the entire delta is utilised for perennial crops. In 1920 nearly a million acres were irrigated by this system. Two further canals have also been made and there is a large reservoir at Lake Beale.

Godefroy, Frédéric Eugène (1826-

97), a Fr. literary historian, b. in Paris. He compiled the *Dictionnaire de l'ancienne langue française et tous ses dialectes du IX^{ème} au XV^{ème} siècle* (10 vols.), 1880-1903, which involved a stupendous amount of laborious research and is a standard reference book. Another important work of his is a *Histoire de la littérature française depuis le XV^{ème} siècle jusqu'à nos jours* (9 vols.), 1859-81.

Goderich, Viscount, see RIPPON, FREDERICK JOHN ROBINSON, EARL OF.

Godesberg, a tn. in the Prussian Rhine prov. of Germany, situated on the l. b. of the Rhine, opposite Königswinter, 4 m. S. of Bonn. Its popularity as a summer resort is largely due to its hydropathic establishment and mineral springs, but it is also a pretty town with a picturesque castle in ruins. Consult Dennert, *Godesberg, eine Perle des Rheins*, 1900. Pop. 20,130.

Godet, Frédéric (1812-1900), a Swiss Protestant theologian, b. at Neuchâtel. In 1873 he left the state church and became one of the founders of the free evangelical church of Neuchâtel, and till 1877 was its theological professor. G. was a great scholar, and his commentaries are among the most noteworthy published during the last century. Besides his commentaries on the Gospel of St. John (2 vols.), 1863-65 (Eng. trans. 1877); St. Luke (2 vols.), 1871 (Eng. trans. 1875); the Epistle to the Romans (2 vols.), 1879-80 (Eng. trans. 1880); and Corinthians (2 vols.), 1886-87 (Eng. trans. 1886), he published *Etudes bibliques*, 1873-74; *Introduction au Nouveau Testament*, 1893, etc.

Godfather and Godmother, see SPONSORS.

Godfrey, Sir Dan (b. 1868), Eng. conductor. b. in London, June 20. Director of Music to the Bournemouth Corporation since 1893. The Godfrey tradition has been closely associated with British music for four generations, beginning with Charles G., bandmaster to the Coldstream Guards (1825-63), who left three musical sons who were bandmasters to the Coldstream Guards and Royal Horse Guards, and one of whom, Dan, left two sons, Dan, the subject of this article, and Harry, also a military bandmaster. Sir Dan was knighted in 1922 for his services to British music. He was educated at King's College School and in Germany. Studied music in London under Lazarus and Alfred Caldicott, and also military band orchestration under John Hartman. Toured S. Africa 1891 for the Standard Opera Company: musical

adviser to Olympia Ltd., 1893; and appointed resident musical adviser and director of music at Bournemouth, 1894. The corporation of that town took over control of music in 1896 when 'Dan Godfrey's Band' was converted into the Bournemouth Municipal Orchestra, the first of its kind established in England. This band numbers about forty permanent members, augmented to fifty for special parts. D. G., who is responsible for the complete administration of municipal music in the borough, controls an annual expenditure of about £30,000. By the long and consistent support given to native composers he has done much towards building up the modern renaissance of music in England. Published his *Memories and Music*, 1924. (See *A Dict. of Modern Music and Musicians*, Dent, 1924.)

Godfrey of Bouillon (c. 1060-1100), a leader of the first crusade, the second son of Eustace II., Count of Boulogne. He was b. at Baisy in Belgian Brabant, and served in the train of the Emperor Henry IV. He fought with conspicuous gallantry at the siege of Rome (1084) and was rewarded with the duchy of Lower Lorraine. In 1096, with his brothers Eustace and Baldwin, he rode to Constantinople and paid homage to Alexius in 1097. Two years later he led the march to Jerusalem, and was elected its ruler on July 22. In Aug. of the same year he defeated the Sultan of Egypt on the plain of Ascalon; and after a year spent in organising he died. See De Hody, *Godefroid de Bouillon*, 1859; Froboese, *Gottfried von Bouillon*, 1879.

Godhra, a tn. of Bombay, British India, in the dist. of Panch Mahals, 50 m. N.E. of Baroda. The principal trade is timber, obtained from the surrounding jungle. Pop. 27,000.

Göding, a tn. of Czechoslovakia in Moravia, situated on the R. March, 22 m. N.E. of Nikolsburg. There is a royal castle. The principal manufs. are glass, sugar, and tobacco. Pop. 12,000.

Godiva, Lady, the wife of Leofric, Earl of Mercia and Lord of Coventry. According to legendary history she released the townsfolk of Coventry from the heavy taxation imposed by her husband by riding through the town clothed only in her long hair. In St. Michael's Church there is a stained glass window commemorating her magnanimous action, and in a niche is an effigy of 'Peeping Tom,' who was said to have been struck blind as he peeped at her behind his shutters.

Godolphin, Sidney Godolphin, Earl of (1645-1712), an Eng. politician, b. at Godolphin Hall, near Helston,

Cornwall. He became attached to the court as a page in 1664, being promoted to a groom of the bedchamber in 1672. He accompanied Sir W. Godolphin on an embassy to Spain (1668), and ten years later was sent as envoy-extraordinary to the Netherlands to negotiate between the Prince of Orange and the Duke of York. In the following year he sat among the Commons, and was appointed a Commissioner of the Treasury. He became First Commissioner in 1684, when he was raised to the peerage. On the accession of James II., G. was appointed chamberlain to the queen, but he returned to the Treasury in 1686, and supported his sovereign at the Revolution. William III., however, retained him in office until 1696, when with other Tories he was obliged



SYDNEY, FIRST EARL OF GODOLPHIN

to retire before the Whig party. In 1700 he was once more reinstated, and on the accession of Anne in 1702 became Lord High Treasurer, an office which he held till 1710, when Anne, under the influence of Harley and Mrs. Masham, began to view him with disfavour. He and Marlborough effected the dismissal of Harley, but a few months later G. was himself summarily dismissed by the queen. He d. at Marlborough's seat, Holywell House, near St. Albans. He was a wise and cautious administrator, and by his masterly control over the finances did much to secure the success of Marlborough's famous continental campaigns. Consult the *Life* by the Hon. Hugh Elliot, 1888.

Godoy y Alvarez de Faria, Manuel de, see **ALCUDIA**, DON MANUEL DE **GODOY**, DUKE OF.

God Save the King (or Queen), the Eng. national anthem, of uncertain origin and authorship, first per-

formed in 1740, to celebrate the capture of Porto Bello, S. America, by Vernon. It is usually attributed to H. Carey (1696-1743), or to John Bull (1563-1628), who wrote an 'ayre' very similar to the present tune, which is in two sections of six bars and eight bars. The tune was adopted in France in 1776, and has been used as the Danish, Prussian, and German national air. Beethoven introduced it into his *Battle Symphony*, and Weber used it also. The American national air 'My country, 'tis of thee' (written by Dr. Smith, 1843) is sung to the same tune. In Germany it is sung to *Heil dir im Siegerkranz*. The old Latin hymn, *O Deus Optime* (probably written about 1688) was set to Bull's 'ayre,' and had words very similar to the present English version. It is sung on all ceremonial occasions throughout the British empire. Words and music first appeared in *Harmonia Anglicana*, 1742, and in *Gent. Mag.* 1745. See Clarke, *Account of the National Anthem*, 1822; Chappell, *Collection of National Airs*, 1838-40; Bateman, 'The National Anthem,' in *Gent. Mag.* (cclxxv.), 1893; Hadden, 'The "God save the Queen" Myths,' in *Argosy* (lxxii.), 1900; Grove, *Dict. of Music*, ii.; *The Minstrelsy of England*, 1901; Cummings, *God Save the King*, 1902.

God's Truce, the name given to a means of promoting peace devised by the Church, when, after the fall of Charlemagne's empire, the right of private war and vengeance (as practised by early Teutonic races) threatened to become a source of anarchy instead of a rough and ready form of justice, in the ninth and tenth centuries. There was a mutual agreement on the part of the barons and nobles of certain districts to abstain from war between fixed days, and respect the rights of all following purely peaceful callings, such as priests, travellers, or tillers of the soil. Originating in S. France at the Synod of Tuluges in Roussillon, 1027, the custom spread to Germany, Italy, Spain, and England. The chief stipulations were: (1) The keeping of peace from Wednesday evening to Monday morning; (2) during Advent and Lent; and (3) on the principal saints' days and holy-days. Breaking of the *treuga Dei* was punishable by fines, banishment, and excommunication. The Council of Clermont confirmed the Truce (1095) under Urban II. The Emperor Henry III. (1017-56) adopted it as imperial law. It fell into disuse in the thirteenth century. See Semichon, *La Paix et la Trêve de Dieu* (2nd ed.), 1869.

Godunov (or Gudunoff), Boris, see BORIS, FEDOROVICH GODUNOV.

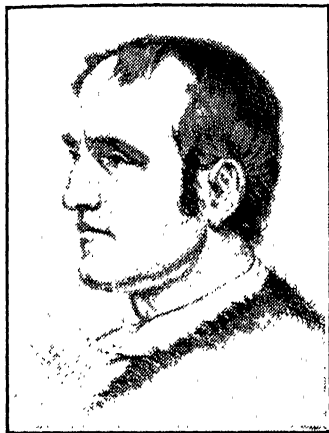
Godwin, or Godwine (c. 990-1053), Earl of the W.-Saxons, or Wessex, a great Eng. noble, one of Cnut's most powerful supporters by 1020. He helped to place Edward the Confessor on the throne of England (1042), and headed the national party against the Norman favourites. His daughter, Edith, married the king, and his son, Harold, was the last native Eng. king (killed at Hastings, 1066). The Norman party grew powerful, and G.'s influence waned, partly owing to the crimes of his son, Sweegen. Outlawed in 1051, he fled to Flanders, but returned next year and was welcomed by the people, forcing Edward to restore him to his old position. See Freeman, *The Norman Conquest*, i. and ii., 1870-79; Green, *The Conquest of England*, 1883; Saxo, *Hist. Danica* (ed. 1644).

Godwin, Francis (1562-1633), a son of the Bishop of Bath and Wells, b. in Northamptonshire. He graduated at Oxford in 1580 and then took orders, being made sub-dean of Exeter in 1587, and Bishop of Llandaff four years later. He is chiefly remembered by his fanciful story, *The Man in the Moon*, which undoubtedly had an influence on Swift's *Gulliver's Travels*. Cyrano de Bergerac imitated and translated G.'s work into Fr. G. also wrote *Rerum Anglicarum Annales*, 1616.

Godwin, Mary Wollstonecraft (1759-97), an Eng. writer of Irish descent, and pioneer of the 'Women's Rights' movement. She had to earn her living by teaching (1778-88), and then worked for Johnson, the publisher, as reader and translator. While thus engaged, she met Paine, Priestley, and Fuseli. Going to Paris she collected materials for her unfinished *Historical and Moral View of the French Revolution*, i., 1794, and there met Captain Imlay, who soon deserted her. She married W. Godwin in 1797, dying at the birth of their daughter. In 1851 her remains and those of her husband were removed from Old St. Pancras churchyard to Bournemouth. A portrait of Mary Wollstonecraft, by Opie, is in the National Portrait Gallery. Mrs. Opie's *Adeline Mowbray*, 1804, was founded on the outlines of Mary's life. Her works include: *Thoughts on the Education of Daughters*, 1787; *Original Stories from Real Life*, 1788; *Answer to Burke's Reflections on the French Revolution*; *Original Stories for Children*, 1791; *Indication of the Rights of Woman*, 1792; posthumous works, 1798, including *The Wrongs of Woman*, or *Maria*, a Fragment; and *Letters to Imlay* (new ed. with Memoir by Paul), 1879. See *Memoirs* by Godwin, 1798; Pennell (1885,

Eminent Women series); Rauschenbusch-Clough, 1898; *A Defense of the Character and Conduct of the late M. W. Godwin* (anon.), 1803.

Godwin, William (1756-1836), a famous Eng. novelist and miscellaneous writer. He was a dissenting minister, preaching at Ware and Stowmarket in 1777-82. His faith being shaken by the study of Fr. philosophers, he gave himself up to a literary career. He wrote: *Life of Chatham*, 1783; *Sketches of History in Six Sermons*, 1784; but his first important work was *Enquiry Concerning Political Justice*, 1793. In this he revealed himself as a sympathiser with the French Revolution, and representative of English Radicalism. He married Mary Wollstonecraft in 1797, though both disregarded the



WILLIAM GODWIN

importance of a legal tie except for the sake of the children. G.'s views, however, became modified in later life. He knew many celebrated people of the day, such as Paine, Southey, Coleridge, Lamb, and Shelley (who married his daughter, Mary, 1816). His works include: *The Adventures of Caleb Williams*, 1794; *St. Leon*, 1799; *History of the Commonwealth of England*, 1824-28; *Thoughts on Man*, 1831; *Mandeville*, 1817; *Fables*, 1805, and other children's stories under the name 'E. Baldwin.' See Hazlitt, *Spirit of the Age*, 1825; Stephen, *English Thought in the 18th century*, 1876; Paul, *W. Godwin* . . ., 1876; De Quincey, *Literary Reminiscences*, i.

Godwin-Austen, Henry Haversham (1834-1923), a famous Eng. surveyor. He joined the army in 1851, doing survey work in India after 1857; making many remarkable ascents in the Himalayas. In 1862 he ascended Mata, 20,607 ft. The second highest mountain in the world, in the Mustagh range, Himalayas, near Karakoram Pass (28,250 ft.); Everest, in Nepal, being 29,002 ft.), was named after him, 1888. He discovered numerous glaciers, including the Baltoro glacier near by. His works include: *On Land and Fresh-water Mollusca of India*, 1882-99; *The Fauna of British India* (with Dr. Blandford), 1908.

Godwit, or *Limosa*, a genus of wading birds of the snipe family (Scolopacidae), much resembling sandpipers. They have very long bills, slightly upcurved; long, slender legs, with a great part of the tibia bare of feathers, and the claw of the third toe comb-like. Five species of this genus *Limosa* are known, all frequenters of marshes, especially by the sea-shore. They inhabit the Arctic and temperate regions of the northern hemisphere chiefly, but migrate southwards in the summer as far as N. Africa, S. America, and even New Zealand. As birds of passage, the black-tailed G. (*L. belgica*) and the bar-tailed G. (*L. lapponica*) are found in Britain. The former at one time used to breed in E. England. The females are larger than the males. Other species are the marbled and the Hudsonian G. (*L. fedoa* and *L. haemastica*), or 'marlin.' Gs. are valued as a table delicacy, and sent from Holland to London.

Goeben, August Karl von (1816-80), Prussian general, b. Dec. 10, at Stade, Hanover; son of Major Wilhelm von G. Became lieutenant of infantry. In Carlist adventure in Spain, 1835-40. In 1860, under O'Donnell in Morocco. In Prussian wars against Denmark (1864) and Austria (1866). In Franco-Prussian War, commanded 8th Army Corps; at Saarbrücken, Gravelotte, and Metz; commanded north of France campaign that ended in victory of St. Quentin, Jan. 19, 1871. Commanded 8th Army Corps at Coblenz till his death there, Nov. 13.

'Goeben' and **'Breslau,' The.** These two ships, which during the earlier part of the Great War eluded the vigilance of the British Navy and got into Turkish waters, were nominally bought from the Ger. gov. by Turkey as 'compensation' for the action of the British gov. in taking over three other ships which at the time were being built in English ship-yards to the order of the Turkish

gov. As a fact, Ger. crews remained in charge of the ships. There is no doubt that their acquisition by Turkey was so material an accession to that country's feeble naval strength that it was one of the factors which decided the Porte to enter the conflict, though Turkey had long been predisposed to that course by the proselytising work of Ger. propagandists. The Turkish gov. had ordered three warships to be built, *Resciadié*, *Sultan Osmanli* and *Fethé*. Be the cost what it might, Turkey was resolved to have a fleet superior to that of Greece, and the Turkish people were united in a common sentiment of revenge. But on the outbreak of the Great War, and while Turkey was still neutral, the British gov., exercising the well-established right of pre-emption, took over the Turkish ships. The *Goeben* and *Breslau* were then in the Mediterranean, and, escaping the British squadron under Admiral Troubridge, came out of their refuge at Messina at 5.30 a.m. on Aug. 7, 1915 and afterwards made a dramatic reappearance before Constantinople on Aug. 11. The plot was a clever one. Germany 'generously' offered her two ships to Turkey by way of compensation for England's 'theft,' the pretence being that the Turkish gov. had bought the ships from Germany. Russia and the Allies, generally, protested. The Porte remained undecided, but, urged on by Ger. support and the Ger. military mission in Turkey, fell into the trap. The deciding factor was the attack on the Russian torpedo boats in the Black Sea, the Ger., indeed, determining the matter for Turkey and involving that country in hostilities. The British gov. contended that legally the two battleships should be dismantled and the crews interned. Eventually the British gov. agreed to the Porte's wishes that the crews should remain on board until the Turkish crews, which had come to England to sail the ships in commission to Turkey, should have returned. But when these crews did reach Turkey it was too late, for the Gers., abetted by Enver Bey, had carried through their intrigue, with the result that Admiral Limpus and his British officers had to leave the ships and Turkish officers came aboard. The British Admiralty held an exhaustive inquiry on the escape of the two ships, with the result that Rear-Admiral Troubridge applied for trial by court-martial. This was convened at Portland with Admiral Sir George Egerton, Commander-in-Chief, Devonport, as President. The finding of the court-martial

was an honourable acquittal for Rear-Admiral Troubridge. From the findings of the court-martial, it appears that the British forces in the Mediterranean comprised three battle cruisers (each capable of attacking the *Goeben*), four armoured cruisers, four light cruisers, and twelve destroyers. By Admiralty orders each of the battle cruisers was placed in a line of patrol some 300 m. from Messina. The conduct of the four armoured cruisers was governed by an Admiralty order which emphasised the importance, at so early a stage of the war, of not allowing the Mediterranean Fleet to be reduced and of avoiding battle with a superior enemy force. The *Goeben* was a 28-knot boat, as against the 20-knot speed of the armoured cruisers, and her guns had a range of 18,000 yards as against 14,000-15,000. Hence the *Goeben* could have steamed round Troubridge's squadron and sunk each boat in detail. Moreover, the twelve destroyers were short of coal. The inference seems to be that the Admiralty were responsible for the action or inaction of all the ships. When Troubridge learned on Aug. 5 that the Austrian Fleet was cruising outside Pola, that the *Goeben* was at Messina, and was going E. shadowed by the *Gloucester*, and thereafter that she was steering towards the Adriatic and still later coming S.E., he presumably was justified in declining to abandon his watch on the Adriatic, especially as the British battle cruisers were then 30 m. W. of Marsala and Fr. troops were in process of transportation between Algiciras and France.

Goedeke, Karl (1814-87), a Ger. historian of literature, b. at Celle. He was educated at Göttingen, and eventually became professor of history there, which position he filled from 1873 till his death. His principal work is *Grundriss zur Geschichte der deutschen Dichtung*, and his biography of Goethe is also well known. He was a remarkably prolific author, and wrote several novels and a drama entitled *König Kodrus, eine Missgeburt der Zeit*, besides much critical and biographical literature. Besides those mentioned, his publications include: *Deutschlands Dichter von 1813 bis 1843*; *Elf Bücher deutscher Dichtung von Sebastian Brant bis auf die Gegenwart*; and *Deutsche Dichtung im Mittelalter*.

Goeje, Michael Jan de (1836-1900), a Dutch Arabic scholar; educated at Leyden under Dozy. In 1866 he was appointed to the chair of Arabic at Leyden. He issued an edition of *Tabari* (1879-92), and wrote vols. iii.-

v. of *Catalogus Codicum Orientalium Bibliothecae Lugduno-Batavae*, 1865-73. Among his other works are: *Edrisi's Description de l'Afrique et de l'Espagne* (with Dozy), 1866; *Liber Expugnativus Regionum, Auctore al-Beladrosi*, 1866; *Fragmenta Historicorum Arabicorum*, 1869-71; *Bibliotheca Geographorum Arabicorum*, 1870-92; *Memoires d'Histoire et de Géographie Orientale*, 1862-86; *Diwan Poëta Moslim ibn-al-Walid*, 1875; *Selections from the Annals of Tabari* (Semitic Library), 1902.

Goes, a fortified tn. of Holland in Zealand, on the island of S. Beveland. There is a Gothic church (1423) and picturesque town hall, restored in 1771. It is the centre of the linen industry; others are brewing, book-binding, boatbuilding, and the manuf. of cigars. It has a good harbour. Pop. about 8000.

Goes, Bento de (1562-1607), a Jesuit missionary of Portuguese birth, b. in the Azores. Until his twenty-sixth year he led the life of an adventurer in the E. Indies, but in 1603 was sent on a mission to the Great Mogul, and thence to Cathay. Many translations of his notes and observations were made into Ger., Fr., and English. On his travels he acquired an extensive knowledge of the geography of Asia, ascertaining that Cathay and China were one and the same place. *The Travels of B. de Goes from Lakh to China* was the name given to the English version of his writings.

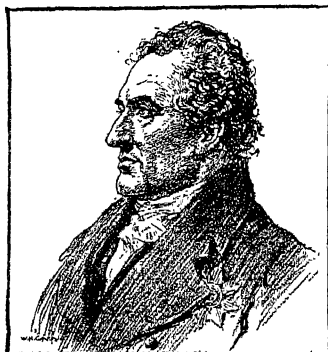
Goes, Hugo van der (1420-82), a Flemish painter, b. at Ghent. He became known by his picture, 'The Meeting of David and Abigail,' which attracted a good deal of attention. Van Ryck instructed him in the rudiments of oil painting.

Goethals, George Washington (1838-1928) American major-general and engineer; b. June 29, at Brooklyn, N.Y. At eighteen entered College of City of New York; but in 1879 went to West Point, where he graduated, 1880. With corps of engineers at Willet's Point, N.Y. Afterwards at Cincinnati, engaged improving channel of Ohio. Taught for a while at West Point; worked at river improvements, neighbourhood of Pittsburgh. Captain, 1891. Engineer of Muscle Shoals Canal, Tennessee River. In 1894, summoned to Washington to assist chief of engineers. On outbreak of war with Spain 1898, chief engineer of 1st Army Corps. After this service, stayed three years at West Point; then, as major in regular army, took charge of fortifications at Newport, R.I. Next became member of general staff at Washington. In 1905, graduated from Army War

College. In 1907, appointed chief of new organisation of work on Panama Canal, with supreme civil and military power. Full colonel, 1909. After opening of Canal, May 1914, first civil governor of Canal Zone—resigned, 1916—having become Major-General 1915. State Engineer, N.J.; but on entry of U.S.A. into Great War, manager Emergency Fleet Corporation. Late in 1917, acting Quartermaster-General. In 1918, chief of Divn. of Purchase, Storage, and Traffic; member War Industries Board. Retired from service, March 1919; became head of engineering business. Died in New York, Jan. 21.

Goethe, Johann Wolfgang von (1749-1832), a Ger. poet, dramatist, and philosopher who 'placed his nation at the head of the intellectual movement of the century' (Scherer). G. was b. at Frankfort-on-Main, of an affectionate and joyous mother, who was her son's first playmate and teacher, transmitting to him her love of story-telling and her mirthful disposition, and of a cold, stern, rather pedantic father, whose uprightness and stability of character must have entered in some degree into his son's composition, since G., 'often erring,' as he tells us, always 'found himself' again. The G. family belonged to the well-to-do burgher class, and the poet's whole life was spent in conditions of prosperity and comfort, a circumstance which his detractors use to belittle him, and his admirers (Carlyle, Lewes, and others) to add to his glory, in that he maintained throughout life a high degree of simplicity, even austerity, in material things. In 1765 he entered Leipzig University as a law student. Here he spent three restless years, distinguishing himself, on the one hand, for unusual wisdom, and on the other for recklessness, extravagance in thought and behaviour, for waywardness and melancholy, alternating with high spirits. He filled his days with pleasure and some study, came under the influence of the Fr. dramatists at the theatre, began his life-long habit of falling in love, and returned home in broken health to an angry father with two comedies of his own composition, *Die Laune des Verliebten* and *Die Mitschuldigen*. Next he studied at Strasburg for about two years, where he formed a friendship with Herder, who roused in him an overwhelming enthusiasm for Shakespeare and for the old Ger. epics. The result of this was that G. soon became one of the foremost leaders in the *Sturm und Drang* ('Storm and Stress') movement which expressed the reaction

against the tyranny of classical and Fr. influence on thought and literature, and the wish to put away all that was artificial, to return to 'Nature' and 'Reality.' Lessing had preached this, and the young 'Romantic School' practised it, even to outrageousness at times. G.'s two dramas, *Goetz von Berlichingen* and *Die Leiden des Jungen Werthers*, are the direct outcome of this movement. The former was written soon after G. left Strasburg, though not published until 1773; *Werther* was published in 1774. At Strasburg the poet studied art, gained his degree of *doctor juris*, and wrote some of his most beautiful lyrics under the inspiration of Frederika Brion. His life at Wetzlar in 1772, in close friendship with Kestner and his betrothed, Charlotte



JOHANN WOLFGANG VON GOETHE

Buff (Lotte), with whom G. fell in love, creating a situation honourably sustained by all three friends, gave him the inspiration for *Werther*. The romance embodies the actual facts of this experience up to a certain point only, though the description of its effect on Werther's (G.'s) temperament is truer to life. The book caused a tremendous sensation, abroad as well as in Germany. Carlyle calls it 'the voice of the World's Despair.' G., in whose writings 'the moral lesson is seldom so easily educed as one could wish,' takes, as it were, a text in this case and heads his work with the motto, 'Be a man and follow him *not*.' G. was now living in Frankfort, and here his acquaintance was sought by the most notable men of the day in Germany, among others Klopstock, Lavater, Basedow, Jacobi, and the

Stolbergs. *Clavigo*, *Stella*, *Pro-metheus*, *The Wandering Jew*, and *Mahomet* were produced; *Faust* was begun, and immortal lyrics were addressed to Fraulein Schönmemann (Lili). In 1775 G. accepted an invitation from Duke Karl August to his court at Weimar. The strong attachment which already existed between the two men was deepened by further intercourse, and Weimar was henceforth the poet's home. He took part in public life, was created Geheimrath (Privy Councillor), then President of the Chamber of Finance, and was ennobled in 1782. His intellectual activities were stimulated by the Duke and his wife, the Duchess Luise, and a circle of brilliant friends, including Herder, Musæus, Knebel, Wieland, and Schiller. His love for the Frau von Stein, which lasted ten years and inspired further lyrics, dates from 1776. A note in G.'s diary shows that he decided at Weimar to have done with the lawlessness of youth and to start on a course of self-culture; he saw that he had, to use Browning's words, 'Something to cast off, somewhat to become,' or as he himself expressed it later, he resolved to cease doing things by halves and to work out life in its totality, beauty, and goodness, 'Vom Halben zu entwöhnen, und im Ganzen, Guten, Schönen, resolut zu leben.' The first sketches for *Iphigenia*, *Tasso*, *Egmont*, and *Wilhelm Meister* were made; *Faust* was continued, and lyrics produced. In 1786 he escaped from the work and festivities of Weimar and went to Italy, where he spent a year and a half, mostly in Rome and Naples. Here he worked at his poems: and plays, studied and practised art (Tischbein and Angelika Kauffmann were among his friends), and pursued investigations in science. This was a period of great development for G., indeed it changed his intellectual standpoint. He outgrew the *Sturm und Drang* phase and worked towards the Gk. ideal of calm and harmony, re-casting and publishing (1786) under this new influence *Iphigenia*, in which the rules of classical poetry, cast aside with jubilant satisfaction in his earlier writings, were closely observed. His matchless *Roman Elegies* (1788) enshrine side by side this new spirit and his love for Christiane Vulpius, who became his wife in 1806. *Tasso* (1790) reflects the conflicts in the author's own mind caused by the various influences he had encountered in his life up to then. In 1794, G. and Schiller, who hitherto had been but mere acquaintances and, in some degree, rivals, entered upon a close and noble friendship which lasted

until Schiller's death. Schiller constantly aroused G.'s enthusiasm, and G.'s influence made Schiller a clearer thinker. The two poets started a magazine, *Die Horen*, to try to raise the standard of taste in art and literature; it failed, and the epigrams, called the *Xenien*, the joint work of the two friends, were 'fired off,' in revenge, against the magazine's enemies. The publication, in 1796, of *Wilhelm Meister's Lehrjahre* (or Apprenticeship) established G.'s fame for ever. In this rambling and discursive romance in eight books, G. develops his philosophy of the conduct of life in describing the career of a young Ger. artist at the beginning of the nineteenth century. In the course of the work the weak-willed, dreamy, self-indulgent hero attains power of self-control and a sense of duty. But, as is usual in G.'s writings, there is no direct moral teaching; the work is a picture of 'rich, manifold life brought close to our eyes,' and the picture, being true to life, reflects the laxity of morals in the Germany of the time, and it is drawn without that comment which alone would have satisfied hostile critics. One of the many varied scenes in the volume is the unforgettable poetic and touching incident of Mignon and the Harper, which has deservedly become universally famous. The valuable criticism on *Hamlet* is also to be found in *Wilhelm Meister*. *Hermann und Dorothea* (1798), written in a spirit of patriotism, is a poem of simple beauty and idyllic charm, with a background of troublous times, the fruits of the Fr. Revolution, towards which G. felt no sympathy. In it the human and tender side of the poet's genius is seen at its best; it is his masterpiece in this kind. G.'s greatest work, *Faust*, occupied him in the intervals of other work for upwards of fifty years: it has been well called 'the companion of his literary life,' and was first published as a whole, in 1831. It reflects the evolution of the thoughts and character of the man G. from youth to age, and is therefore of unique biographical interest. Faust, like G., struggles for perfection, often yields to evil but never comes to love it or to lose his belief in the right and good. His failure in his quest for absolute knowledge leads him to despair, from which he is rescued only by a life of useful labour. This outcome leads us straight to the keynote of the Goethean philosophy—*renunciation and resignation*, and to the poet's conviction that 'He only earns his freedom and existence, Who daily conquers them anew' (Bayard Taylor's trans.), in Faust's dying words:

'Nur der verdient sich Freiheit wie
das Leben,
Der täglich sie erobern musz.'

The two parts of *Faust* are as dissimilar as the influences under which they were written, Part I. being 'romantic,' and Part II. 'classical,' in form and spirit. The involved symbolism of Part II. is very difficult to comprehend. Both parts rise to the loftiest heights of poetry and art. G.'s achievements in science, optics, botany, anatomy and mathematics include some useful discoveries and many misconceptions; his discovery of an intermaxillary bone in man was important. His principal scientific treatises are *Metamorphosis of Plants* and *Farbenlehre, Theory of Colour*. G.'s life and character are best studied in his works, nearly every one of which presents some aspect of the man as he was when he wrote it. As Carlyle says: 'In Goethe's works . . . we see . . . a mind working itself into clearer and clearer freedom, gaining more and more perfect dominion of its world.' His formal autobiography *Dichtung und Wahrheit*, 1811–22, the work of his old age, abounds in inaccuracies, not in fact alone, but more seriously, in what Lewes calls 'tone.' See translations of the autobiography, novels, tales, and dramas in Bohn's Standard Library; Carlyle's translation of *Wilhelm Meister*; Bayard Taylor's translation of *Faust*; Lives by G. H. Lewes, J. Sime (Great Writers), and Secley; various essays by Carlyle, and Scherer's *History of German Literature* (trans. Conybeare).

Goetz de Berlichingen, see BERLICHINGEN, GOTZ VON.

Gog and Magog, names used several times in the Bible. In Genesis, Magog is spoken of as a son of Japhet; in Ezekiel G. appears as Prince of Magog, an enemy of Israel in the Far North, and in Revelation G. and Magog are considered as a comprehensive term for the powers of evil. The names are also given to the two giants in the Guildhall, London. Several legends are extant as to their origin, but they seem to have been connected with London history since the reign of Henry V. The original figures were burnt in the Great Fire, and the present ones made in 1708.

Gogh, Vincent Willem van (1853–1890), Dutch painter; b. March 3 at Groot Zundert, N. Brabant; son of Theodorus van G., clergyman of that place. Employed by Goupil & Co., art dealers, 1869–76, so came to live in England. Disappointed in love, left Goupil's; schoolmaster in England, 1876; studied theology

in Amsterdam 1877-78; did some evangelising among Belgian miners, and drew. Began to study painting at The Hague, 1882. In 1884, studied in Antwerp Academy. Joined his brother in Paris, was introduced to the Impressionists. Painted at Saint Rémy and Arles, associated with Gauguin. Always weak in health, spent his last days in hospital at Auvers-sur-Oise, where he shot himself and died, July 29. He painted figure, still-life, and landscape; and was a 'post-impressionist.'

Gogo, a port and tn. of Bombay. India, situated in the Ahmadabad dist. There is a safe anchorage for vessels, and the town is commercially important. Cotton and salt are the chief products. Pop. 10,000.

Gogol, Nicolai Vasilievitch (1809-52), a Russian author, b. at Sorochintsi, Poltava; educated at Niezhin, and in 1829 went to St. Petersburg, where for a short time he was a gov. clerk. He made several unsuccessful attempts to gain a footing in literature, but in 1831 produced *Evenings in a Farm near Dikanka*, which became very popular. A second series appeared in 1834. This work is a collection of stories and sketches of several types, depicting the life of Little Russia with great truth and vigour. Love of nature and of the supernatural, humour, pathos and descriptive power are among the attributes of the writer's style. Among the best of the tales are: *Taras Bulba* (Eng. trans. 1887), a thrilling account of the Zaporogian Cossacks; *Old-World Gentlefolks*; *How the Two Ivans Quarrelled*; *Nevsiki Prospect*; and *Alakia Alakievitch's New Cloak*. In 1836 he produced *The Government Inspector* (Eng. trans. 1891 and 1893), a comedy exposing the vices of provincial administrative officials; and in 1837 his best work, *Dead Souls* (Eng. trans. 1886), a strong and gloomy novel dealing with provincial life. During 1836-46 G. lived abroad, mainly in Rome. His collected works and correspondence appeared at Moscow in 6 vols. in 1856-57. See the works of P. Kulisch, 1856; and Zabel, 1899; and C. E. Turner's *Studies in Russian Literature*, 1883.

Gogra, a river of Oudh, India, rising in the Himalayas. It flows S.E. and enters the Ganges just above Chapra, after a course of 600 m. It is navigable almost to the mountains, and at its junction with the Ganges is from 1 to 3 m. wide.

Goitre, a swelling of the thyroid gland, which is situated in the front of the neck. It is also known as Derbyshire neck. The condition is more prevalent in some countries

than others, and occasionally it is so common that practically all the inhabitants of a certain locality are affected by it. Sometimes it is specially prevalent in mountainous districts; at others it appears in lowland ones. As a rule, scattered cases are more common in women than in men. The importance of the condition depends upon the fact that the thyroid gland, which is essential to the nourishment of the whole body, is attacked in G., and its functions may be so impaired that the skin, hair and teeth are affected. The aspect of the patient is characteristically altered; the powers of mind and body are impaired, this weakness gradually increases, and the perceptive powers of hearing and sensation are lessened. This condition is known as Myxœdema, and in Ger. the term *Struma* is applied to it. This, however, is somewhat rare when the gland has increased in size, as sufficient remains healthy to supply the needs of the body. Apart from the myxœdematous symptoms, the enlargement of G. presses on the windpipe and considerably impedes respiration.

Exophthalmic Goitre.—In this condition, in addition to increased size of the thyroid, there is exophthalmos, that is protrusion of the eyeballs, and rapid action of the heart. At first one or two only of these symptoms may be present. To this extent the condition is the opposite of myxœdematous G., as it is due to an increased action of the thyroid, instead of a decrease of activity. Here the mental condition is one of irritability rather than impairment. The condition is frequently first noticed after some severe mental shock. In both conditions, if the gland presses on the windpipe, surgical measures must be adopted. In the myxœdematous condition, the deficient action of the thyroid can be supplemented by taking the thyroid extract of animals, but in restricted amounts for fear of causing rapid action of the heart, as in exophthalmic G. This, however, is not often required in G. itself, because, as stated above, sufficient of the thyroid gland remains in a healthy condition to supply the needs of the body.

Gokhale, Gopal Krishna (1866-1915), Indian political leader; b. at Kolhapur; parents of caste of Chitpavan Brahmans. Graduated Elphinstone College, Bombay; became professor, Fergusson College, Poona, at £60 a year. Joined Congress movement; about 1887, sec. to the Sarvajanic Sabha. In England, 1897, witness before royal commission on Indian expenditure. In 1900, elected to Bombay Legis-

lative Council. Soon afterwards selected by its unofficial members to represent them on Imperial Council. Leader of opposition there; nevertheless, on recommendation of Lord Curzon, G. became C.I.B., 1904. In 1905 (in which year he was president of Congress), founded Servants of India Soc., to prepare India for self-government. Member of royal commission on public services in India, 1912. Died at Bombay, Feb. 20.

Golaseccia, a small village on the Ticino river, a few miles from the point where it flows into Lake Maggiore, Italy. It is situated on the site of a famous cemetery of the Iron Age. The first discoveries in this region were made in the early nineteenth century by the Abbé Giani. Castelfranco followed it up in 1874 and published accounts which have formed the basis of all later study. The cemetery consists of hundreds of circles made of unworked stones—each circle, so far, containing a prehistoric tomb, which itself contained a cinerary urn, and sometimes a vase, weapons, and small objects of iron, amber, glass or bronze. The most important discovery so far has been what is known as The Sesto Calende tomb. Under a heap of large stones were found objects of bronze and iron, beneath them pottery and burned human bones with the remains of the funeral pyre. There were also weapons and portions of a chariot. These were sold to the Consulta Archaeologica of Milan and are now in the Sforza Museum, Milan, and can be seen there together with other Golaseccian collections.

Golconda, a decayed city of India, 7 m. W. of Hyderabad, in the Nizam's dominions. It was once the capital of a powerful kingdom of G., and still possesses a strong fortress, built on a granite ridge, and now used as a state treasure and prison house. It was at one time famous for diamonds, which were cut and polished here, and for the immense mausoleums of the anct. kings.

Gold (symbol Au, atomic number 79, atomic weight 197.2), a metallic element that has been known and valued from the earliest times on account of its occurrence in the free state, the ease with which it can be beaten into articles and ornaments, and its unalterability by water or air. The importance of G. as a metal has certainly not lessened in our day, in fact it is used as the standard for exchange (see BIMETALLISM). G. is found almost always in the free state, and sometimes in combination with silver, mercury, and tellurium; it is very widely distributed, and, in fact, there is scarcely a country or deposit

in the world which has not been found to contain G. It occurs principally in rock formations, or in alluvial deposits. The latter, which constituted the chief sources of the G. supply until recently, are termed 'placers,' and consist of an accumulation of gravel, sand, and clay, mixed with particles of G. varying from minute grains to nuggets of considerable size, which have been removed from their original habitat by the action of water and redeposited, e.g. in a hollow of a river bed, the G., by reason of its great density, accumulating in places where the current is least. It must be borne in mind that rivers are constantly altering their course, so that alluvial deposits are to be found not only in the beds of existing streams, but also in terraces on the sides and summits of hills which once constituted the bed of a river. These auriferous deposits may also be covered by more recently distributed material, and are then termed 'deep leads' or 'dead rivers.' In Europe the most important alluvial deposits are those in the Urals; in Asia, those of Siberia; in Africa those of the Rand. In America the Californian deposits were the cause of the 'rush' of 1849, and are now practically exhausted; the Klondike district in Alaska also attracted considerable but short-lived attention. Australia contains the most famous alluvial deposits, which have been marked by the occurrence in them of nuggets of considerable weight. The largest ever found, the Welcome nugget, discovered in 1858 at Ballarat in Victoria, weighed 183 lb. and was worth £8376, whilst several of 50 lb. and over have been found. In all cases the recovery of alluvial G. is in principle remarkably simple; it depends on the fact that the density of the metal is about seven times that of the material forming the bulk of the deposit, and that running water will therefore carry away the lighter particles of sand and clay, leaving the heavy particles of G. behind. The apparatus in which the 'washing' is carried out may be a 'pan,' a 'cradle,' or a 'tom,' whilst for large operations a 'sluice' is used. The *modus operandi* is the same in all; flowing water removes the earthy matter, whilst obstructions of various kinds arrest the metal. Where the deposit is not actually near a river bed, water is conveyed to it under pressure by means of a pipe line, so that it can be thrown in powerful jets against the banks of gravel, which is thus washed down sluices, the G. being collected as before. Alluvial deposits are now of less importance than the rock de-

posits in which G. is found. In these the metal occurs in veins, reefs, or conglomerates of quartz and other silicious material in the form of small particles, sometimes embedded in iron pyrites, copper pyrites, or lead ores. The auriferous rock, which is often mined at considerable depths, is first subjected to crushing and then reduced to a very fine powder by stamps, five of which usually go to form a battery. The mortars in which the stamps work are about 5 ft. long and 4 ft. high, having a feed-opening at the back and a fine sieve in front only allowing particles of from $\frac{1}{16}$ th to $\frac{1}{32}$ th of an inch to pass through. A stream of water is circulated through the mortars, and the fine particles of G. are collected on amalgamated copper plates. The G. amalgam is from time to time removed and the mercury distilled off, leaving the G. behind. The material that escapes still contains some G., and is now 'concentrated' by methods similar to those used in treating alluvial deposits. The concentrates, if free from pyrites, are treated with mercury, the G. being recovered from the amalgam formed. The above method of stamping and amalgamation works satisfactorily with 'free-milling' ores comparatively rich in G., but those ores containing sulphides require chemical treatment to remove the metal from the finely powdered material.

(1) *The chlorination process* is used for treating concentrates containing sulphides and for recovering the G. that escapes amalgamation. The material is first roasted to remove the sulphur and convert the base metals into oxides. It is then placed in large vats, moistened with water, and treated with chlorine gas, which readily converts the G. into the form of chloride, which is washed out, the G. being precipitated in the metallic state by means of ferrous sulphate (copperas).

(2) *The cyanide process*, introduced on the Rand in 1891, is now almost exclusively used for the recovery of finely divided G. It is extremely simple, and consists of allowing the finely crushed ores, concentrates, or slimes to stand in vats with a dilute solution containing from 0.05 to 0.3 per cent. of potassium cyanide. After a day the solution is run off, and the G., which is in solution in the form of a double cyanide with potassium, is precipitated by zinc shaving or by electrolysis, not more than $1\frac{1}{2}$ grains of G. being left in each ton of solution. The metal obtained by any of the above methods is generally alloyed with silver, and contains small quantities of iron, lead, sulphur,

etc. Impure G. is refined by melting it in crucibles with a little sodium carbonate and nitre, the slag formed with the base metals being skimmed off at intervals. The metal remaining consists of an alloy of G. with silver, from which it may be separated by passing chlorine over the molten metal, in crucibles glazed with borax. The fused chloride of silver rises to the surface, and on cooling is poured off from the G., which has solidified beneath. In the case of alloys containing about five times as much silver as G., the separation is effected by 'parting,' or boiling with concentrated sulphuric acid, which dissolves the silver, leaving the G. behind.

Properties.—G. is a soft yellow metal, which appears red when seen by light many times reflected from its surface. In a finely divided state it appears purple and even black, and when gold-leaf is viewed by transmitted light it appears green. It is a very heavy metal (sp. gr. 19.4), melts at 1067° C., boils at 2610° C. and is volatile at the temperature of the electric arc. It has a specific heat of 0.0316, is a good conductor of heat and electricity, and is quite unaffected by air and most reagents. G. is the most malleable and ductile of metals, and may be beaten out into leaf having the thickness of only $\frac{1}{250,000}$ th part of an inch; thus one grain of the metal may be made to cover 56 sq. in. of surface, or drawn into a wire 500 ft. long. It has little affinity for other elements, and is easily reduced from its compounds. Most metals when placed in a solution of a G. salt precipitate it, and all its compounds when ignited yield the metal. G. is readily deposited upon other metals by the process of electro-gilding, the most suitable solution being that of the double cyanide of G. and potassium ($\text{Au}(\text{CN})_2 \cdot \text{KCN}$). Two classes of compounds are known, the *aurous* and the *auric*; the former, however, are readily decomposed into the latter with deposition of G. Auric chloride (AuCl_3) is formed when G. is dissolved in aqua regia and the solution evaporated to dryness; it forms a compound (HAuCl_4) with hydrochloric acid which is used in photography under the name of chloride of G. for toning photographic prints. In the presence of the two chlorides of tin, G. chloride forms a purple compound known to the ancients as purple of Cassius. Colloidal gold may be formed by Bredig's process of striking an arc between gold wires under water, or by reducing solutions of gold with phosphorus, formaldehyde, etc. The different solutions have colours according to the sizes of the colloidal particles. Those with larger particles

are blue, whilst in the case of those with a decreasing size in particles, the colour shades from ruby-red to yellow. For the purposes of coinage G. is alloyed with two parts in twenty-four of copper or silver to harden it against the wear and tear of circulation. For use in jewellery various alloys are employed, the 'fineness' being expressed in parts of pure G. in twenty-four: thus 18-carat G. is composed of eighteen parts of the metal alloyed with six parts of copper or silver as the case may be. Silver gives the alloy a paler, copper a redder colour than that of the pure metal. The chief alloys used by the jeweller are:

Red G.	=75 parts	pure G. + 25 parts copper
Dead leaf G.	=70 "	+ 30 " silver
Green G.	=75 "	+ 25 " "
Water-green G.	=60 "	+ 40 " "
Blue G.	=75 "	+ 25 " iron

The interim report of the Gold Delegation of the Financial committee set up under the League of Nations, which was issued in 1930, gives the following figures in respect of gold output. The estimated world production of gold in recent years is shown in these annual averages for each quinquennium since 1920:—

	\$ 000,000
1901-05	323
1906-10	434
1911-15	460
1916-20	392
1921-25	361
For 3 years 1926-28	403

The report states that the present production of gold in the world amounts to about \$400 million per annum, and is likely to rise above that figure during the next three or four years. It may then be followed by a decline. The market price of G. bullion varies with its purity; pure G. (24 carats) is worth £4 4s. 11½d. per oz. troy; standard G. (22 carats) fetching £3 17s. 10½d. per oz. See CURRENCY, MONKY.

Gold, Field of the Cloth of, the name given to the meeting in June 1520 between Henry VIII. of England and Francis I. of France, near Calais. The proceedings, in which Wolsey took a prominent part, and which resulted in the signing of a treaty between the two kings, were characterised by the utmost splendour and extravagance.

Gold-beating, see GOLD LEAF.

Gold Coast, a British crown colony and protectorate in W. Africa, extending for 334 m. along the Gulf of Guinea, and bounded on the E. by Togoland, on the W. by the Fr.

Ivory Coast, and on the N. by the Fr. Sudan. It includes Ashanti and the district known as the N. Territories. The combined area is 78,650 sq. m., that of the G. C. colony alone being 23,490 sq. m. The coast is mainly flat and swampy, and a heavy surf makes landing from vessels very difficult. In 1928, however, an excellent harbour was completed at Takoradi, near Sekondi, the only good shelter for large ships between Nigeria and Sierra Leone. There are several bold headlands and numerous lagoons. The land is flat for some distance from the sea, but rises towards the interior. The low-lying land is very fertile, and palms of

various kinds, coffee, cocoa, Calabar beans, cereals, ground-nuts, ginger, cam-wood, tobacco, etc., are largely grown. The cultivation of rice and sisal hemp has recently been started. Gold, from the production of which the colony derives its name and which was mined by the natives before the coming of the Europeans, is found in large quantities, the chief mines being at Tarkwa and Prestea in the S.W. Diamonds and manganese are also mined. The chief exports are cocoa (more than half the world's supply), palm oil, rubber, palm kernels, mahogany, copra, nuts, ivory, gold dust, diamonds and manganese. The climate is hot, damp, and unhealthy, particularly near the coast. The unhealthiness is, however, rapidly decreasing, owing to the drainage of swamps, improved sanitation, and advances in medical science; and the G. C. now little merits its former title of the White Man's Grave. The chief towns are Accra (the capital), Cape Coast, Sekondi, Addah, Tarkwa, Ehnina, Kwitta, Saltpond, Winneba, Axim, and Akuse in the G. C. itself, Kumasi and Kintampo in Ashanti, and Tamale and Navoro in the N. Territories. The colony is being rapidly developed in the direction of roads, railways, telegraphs, etc. In 1930 there were 495 m. of railway, running from Accra and from Sekondi to Kumasi, and from Huni Valley to Kade. There are also 4678 m. of roads, and 2600 m. of telegraphs; 2600 telephones are employed in the colony, and there is a wireless station at Takoradi. Several of the towns are lighted by electricity and have pipe-borne water supplies. Schools, hospitals, and asylums have also been established. The colony is ad-

ministered by a governor aided by an executive council, the mandated territory of Togoland being also administered by him. For the G. C. alone, there is also a legislative council. The Portuguese were the first white settlers in the country; they built a fort in 1482 at what is now Elmina. The Dutch later found a footing on the coast. The district was first settled by the British in the seventeenth century, and the trade in gold dust and slaves was very large for some time, being mainly carried on by chartered companies. The last of these was dissolved in 1821 when the crown took possession of the forts and settlements. Previous to this, British territorial rights on the coast had been conceded by Ashanti. In 1850 and 1871 the British obtained from Denmark and the Netherlands their possessions in the district. After considerable difficulties the British power was consolidated in 1870-72, though expeditions against Ashanti were necessary in 1874 and 1895. In 1874 the G. C. was made into a separate colony. Ashanti was annexed to it in 1901, and in the same year the N. Territories came under British protection. Pop. (African) Census for 1931: The Colony, 1,545,140; Ashanti, 582,866; Northern Territories, 717,283; British Sphere of Togoland, 275,925; Accra, 59,895; Kumasi, 36,200; non-African, about 2400, mainly British.

Golden Age, a phrase applied to the most prosperous and beautiful period of a country's history, art, literature, etc. The idea originated with the Gks. Hesiod divided the life of a race into five ages, of which the golden, or simple and patriarchal, age was the first. The theory was developed into a regular system of cosmic philosophy, which made Saturn the governing deity of the golden age.

Golden-crested Wren (*Regulus cristatus*), the smallest of European birds, belonging not to the family of the true wrens, but to that of the Sylviidae. The length of the body is about 3½ in., and the plumage is very beautiful. The back is greenish-yellow, the wings and tail are ash brown, marked with black and white, and the cheeks and throat greyish white, while the crown feathers are elongated into a bright yellow crest. It is found all over Europe, and is not uncommon in Great Britain, particularly frequenting fir-woods.

Golden-eye Fly (*Chrysopa perla*), or **Lacewing Fly**, a common British neuropterous insect. In colour it is pale green, with long antennae, gauzy wings, and bright yellow eyes. The length from the tip of the antennae to

the tip of the closed wings is almost 1½ in. The eggs are attached to leaves, etc. by stalks; the larvæ are rough and hairy and feed on aphides and the pupa is enclosed in a white silky cocoon. The name is also applied to an allied species, the *Chrysopa vulgaris*.

Golden Fleece, see ARGONAUTS and JASON.

Golden Fleece, Order of the (Fr. *La Toison d'Or*), one of the Prime Knightly Orders of Christendom, belonging to Austria and Spain. It was founded on Jan. 10, 1429, by Philip III. (The Good), Duke of Burgundy and the Netherlands, at his marriage with Isabella of Portugal at Bruges, and dedicated to the Virgin and St. Andrew. The source of the name is variously given as the story of the Argonauts, the story of Gideon, the wool trade of Flanders, and the golden hair of the Duke's mistress, Marie de Rambrugge. The order had considerable political influence, having power to censure the Grand Master, i.e. the sovereign. The grand mastership, which had been filled by the Habsburg kings of Spain from the loss of the Netherlands till 1700, was claimed in 1713 by the Emperor Charles VI., and the subsequent dispute was tacitly settled by the introduction of the order into both Spain and Austria. See Bon. H. Kenyon de Settenhove, *La Toison d'Or* (Brussels), 1907.

Golden Gate, a strait of California, U.S.A. It is about 1 m. in width, and connects the San Francisco Bay with the Pacific Ocean.

Golden Horn, a narrow inlet of the Bosphorus, separating Constantinople (q.v.) from Galata and Pera.

Golden Legend, a mediæval collection of lives of the saints, made by a Dominican, Jacobus de Voragine (1230-98), who was for some years Archbishop of Genoa. The collection is in five sections and contains 182 chapters. It was very popular, and was translated into many European languages. An Eng. translation by William Caxton appeared in 1483. See the critical edition by Grasse (Dresden, 1846).

Golden Rod, or *Solidago Virgaurea*, a species of Compositæ which is found in Britain and is the only British representative of its genus. The leaves of the plant have sometimes been used to make an infusion as a substitute for tea. There are numerous allied species scattered over America, e.g. *Solidago anadensis*, the Canadian G. R.

Golden Rose, an emblem wrought of pure gold, which is blessed by the pope on Latere Sunday, the fourth Sunday in Lent. Occasionally it is

sent as a mark of papal favour to some Catholic prince or dignitary, to cities, churches, etc.

Golder's Green, a suburb of London, issituated on the R. Brent, 1½ m. N.W. of Hampstead, in the parish of Hendon. Pop. (eccles. dist. 1921) 5146.

Goldfinch (*Carduelis elegans*), a beautiful British bird belonging to the Fringillidae. It is about five inches long, and the plumage of the adult



GOLDFINCH

male is a handsome mingling of black, crimson, yellow and white. Its intelligence and pleasing song make it a favourite cage bird.

Gold-fish, or Golden Carp (*Carassius auratus*), a common fresh-water fish native to China and Japan. In its natural state it is brown in colour, but when domesticated it develops the familiar red-gold tint, and occasionally becomes a complete albino, when it is known as the silver fish. It was introduced into England in 1691, and breeds freely in aquaria or ponds, provided that the water is kept up to a high temperature.

Goldie, Sir George Dashwood Taubman (1846-1925), an Eng. administrator, b. May 20, in the Isle of Man; youngest son of Lieut.-Colonel J. T. Goldie Taubman; educated at Woolwich, and entered the Royal Engineers. He first visited the Niger country in 1877, and immediately began to work towards adding the district to the British empire. In 1879 he formed the United African Company, which united the British commercial interests of the district. He attended the Berlin Conference on W. Africa of 1884-85, as an expert on Niger questions. In 1886 a charter was granted to the company, which became the Royal Niger Company, with Lord Aberdare as governor and

G. as vice-governor. G. succeeded Lord Aberdare as governor in 1895. In 1897 he organised and personally conducted a successful expedition against the Mohammedan tribes of Nupe and Illorin. He served on the Royal Commissions on the S. African War 1902-03, and on War Stores 1905-06; in 1905 became president of the Royal Geographical Society; and an alderman of the London County Council 1908-19. He was made privy-councillor in 1898. Died Aug. 20.

Golding, Arthur (c. 1536-c. 1605), an English translator, b. in London and served under the Protector Somerset and Sir William Cecil. His chief work is a translation of Ovid, published 1565-67. G. wrote an introduction deducing a moral from the tales. His translation was a great favourite with the Elizabethan writers. He also translated several religious works.

Goldingen, a dist. and tn. of Russia, in the government of Courland. It is situated on the Windau R., 40 m. from the Baltic. Pop. (town) about 7000.

Gold Lace, a fabric made of cotton or silk thread covered with fine metal wire, and much used for uniforms, theatrical dresses, etc., and ecclesiastical purposes. The metallic wire employed is made from various substances. In the best qualities pure silver is used, but an alloy of copper and silver is more common, and for very cheap lace copper wire is employed. This wire is annealed and plated and then covered with pure gold leaf, which is made to adhere by heating to red heat in charcoal. In the cheapest varieties the copper wire is electro-plated with silver, and this again electro-plated with gold. The completed wire usually measures 1100 to 1400 yds. to the ounce of metal, and is flattened by steel rollers before being wound over yellow silk or cotton thread by a spinning engine. Much gold thread is manufactured in India.

Gold Leaf, a tissue of that metal, beaten out to .001 in. in thickness. It is beaten to such a fineness for the purpose of gilding various surfaces. The art of gold-beating was known to the ancient Egyptians and was practised by the potters and decorators of both Greece and Rome. A German monk of the twelfth century outlines a process of gold-beating almost identical with that of to-day, and in the days of their prosperity the skilful Florentines were famous for the art. The gold is sometimes alloyed with silver or copper, and is then cast into ingots. Powerful steel rollers flatten the ingots out to a ribbon 1½ in. wide. After annealing, the ribbon is divided into pieces, each weighing

about 6½ grains. These pieces are interleaved in a 'cutch,' the interleaving being effected with small sheets of vellum or tough paper, about 4 in. sq. This 'cutch' or pile is set on a firm marble block and beaten with a seventeen-pound hammer until the gold has spread to the size of the paper screens. Each gold sheet is cut into four, and again interleaved, this time in a 'shoder,' whose leaves are made of 'gold-beater's skin.' This 'shoder' or packet is beaten for two hours with a ten-pound hammer. Finally each G. L. is again divided into four and set between layers of very fine gold-beater's skin, in what is technically called a mould. Here the gold is beaten for the last time, usually for four hours. A seven-pound hammer is used. Twenty-five leaves, which are about 3½ in. square, are sold together in a book; and the fineness of the metal is such that a grain of G. L. will gild 56 sq. in. of surface.

Goldmark, Karl (1830-1915), an Austrian musical composer. *b.* at Keszthely, on the Plattensee; went to Vienna to study music in 1844. In 1857 he gave a concert of his own works. His first opera, *Die Königin von Saba*, was produced at Vienna in 1875, and was followed by *Merlin* (1886), and *The Cricket on the Hearth* (1900). His descriptive symphony *Ländliche Hochzeit*, has been very popular.

Goldoni, Carlo (1707-93), an Italian dramatist. *b.* at Venice, and studied for the law, but early began dramatic writing. His first attempts were tragedies, among which were *Amalasunta* and *Belisario* (1734). But he soon turned to comedy, and succeeded in creating a new school of comedy, based upon character and domestic life, in place of the old farcical type. Among his numerous plays are *Momolo Courtesan*; *La Notte Critica*; *La Bancarella*; *La Donna di Garbo*; *L'Impostore*; *Locandiera*; *Le Baruffe Chiozzotte*; *I Rusteghi*; *Il Ventaglio*; *Il Bugiardo*; *Il Caffè*; *La Pamela*; *Dama Prudente*; and *Zelinda e Lindoro*. A collected edition appeared at Venice in 1788-89, and a selection was translated into English in 1892. See his own *Mémoires*, 1787; and *Lives* by Molmenti, 1879; Galanti, 1883; and Rabany, 1896.

Goldboro, a city of N. Carolina, U.S.A., in Wayne co., situated on the Neuse R., about 49 m. S.E. of Raleigh. The manufs. are knitted goods, cottons, lumber, furniture, and agricultural tools. Fruit and vegetables are largely cultivated. Pop. 14,985.

Goldschmidt, Madame, see LIND, JOHANNA MARIA.

Goldsmid. Family of English Jews

descended from *Aaron*, a merchant of Amsterdam, who settled in England about 1763 and *d.* 1782. His sons *Benjamin* (1753?-1808) and *Abraham* (1756?-1810) set up a bill-broking business about 1777. Benjamin had a fine house at Rochampton, and founded what afterwards became the Royal Naval Asylum. Abraham was joint contractor with the Barings for the four-million Gov. loan of 1810. Unexpectedly called on to bear the main burden of this liability, he committed suicide, Sept. 28, 1810—as Benjamin had done, April 11, 1808. Another of Aaron's sons, *Asher*, was father of Sir *Isaac Lyon* (1778-1859); who financed Portugal, Brazil, and Turkey. He was a founder of University Coll.; laboured with Elizabeth Fry at prison-reform, and with Robert Grant at Jewish emancipation. Made baronet 1841; *d.* April 27, and was succeeded by his son Sir *Francis Henry* (1808-78)—called to Bar 1833 (first Jewish barrister); represented Reading in parliament as Liberal from 1860 till death; a good chairman of committees; *d.* (as result of railway accident at Waterloo station) May 2. Sir *Julian*, last baronet, was son of Sir Francis's brother *Frederick David* (1812-1866), and *d.* Jan. 7, 1896. *Anna Maria* (1805-1889), philanthropist, was eldest daughter of Sir Isaac. Major-general Sir *Frederic John*, K.C.S.I. (1818-1908), diplomatist and author, was son of *Lionel Prager*, a son of Benjamin.

Goldsmith, Oliver (1728-74), a novelist, poet, and dramatist, the son of a poor Irish clergyman, was *b.* at Pallas, co. Longford, Ireland. One of a family of nine, G. early became familiar with the struggle for existence which was to last throughout his life; he also learnt in his father's house that kindness, sympathy, unselfishness, and love of his fellow-men which equally never left him. He was a 'dull' and 'stupid' boy, shy, and of unattractive personal appearance. He first managed to take his degree at Trinity College, Dublin, and then he spent the next three years verse-writing, flute-playing, making merry, teaching, perfunctorily studying law in London and medicine in Edinburgh and Leyden. Then he set off on foot to make a tour of the Continent 'with a guinea in his pocket, one shirt on his back, and a flute in his hand.' Returning to London after two years he drifted into literature, writing for various magazines and compiling histories of Greece, Rome, etc. His papers to the *Bee* and his *Chinese Letters* (republished as *The Citizen of the World*) brought him into notice. He made the acquaintance of John-

son and Reynolds and became a member of the famous 'Literary Club.' His constitutional improvidence, reckless charity, and love of pleasure kept him on the verge of poverty all his life, but he never lost his humorous merriment and love of life. His increasing debts, however, hastened his end. Early in 1774, he was stricken with fever, which, aggravated by mental distress due to the poverty into which his improvidence had steeped him, and by his use of quack remedies against medical advice, terminated fatally on April 4, 1774. A monument to him was erected in Westminster Abbey, with a Latin inscription in eulogy of his works and character



OLIVER GOLDSMITH

by his friend and champion Dr. Johnson. His poem *The Traveller*, which established his position, deals with the conditions of various countries, and has an underlying philosophy. In 1766 he published his masterpiece, *The Vicar of Wakefield*, a story of simple, natural life, largely autobiographical. In it G. may be said to have readjusted the people's vision, in that he discarded the lengthy discussions, artificial form, self-analysis, and over-sentimentality which characterised the novel up to his time and created life-like figures and found new motives outside the restricted sphere where novelists had hitherto sought their materials; he added the idyllic note. In his two comedies which still live and please, *The Good-natured Man* and *She Stoops to Conquer*, there is a reaction against the false sentimentality of the time. *The Deserted Village*, a poem which still

preserves its freshness, embodies the idea that a nation cannot be great unless each individual who helps to create its prosperity has a share in its blessings. G. started in this poem a line of thought which leads straight to the present-day grappling with industrial problems. G., with his large humanity, pathos, and humour, helps, as Scott said, 'to reconcile us to human nature,' and Dr. Johnson pleads, 'Let not his frailties be remembered, he was a very great man.' See *Lives* by J. Forster, W. Irving, Scott, W. Black, A. Dobson, and Thackeray's *English Humourists*.

Goldsmiths, one of the livery companies of the City of London. Mention of the G. among the adulterine crafts occurs about 1212, but their guild does not seem to have attained importance till about 1645, when they began to set up as bankers, being instrumental in the introduction of bills and paper currency. Their bills were even accepted by parliament, but when the Bank of England was established after the Revolution, the company found itself unable to meet the competitors. The G. now stand fifth among the twelve great companies. They have been great educational benefactors and have presented a valuable collection of early books on political economy to the University of London. See Jackson's *English Goldsmiths and Their Marks*, 1905; Herbert's *History of the Twelve Great Livery Companies*, 1837; Hazlitt's *The Livery Companies of the City of London*, 1892.

Goldsmith's Art and Work, The. The working of the precious metals, and notably of gold, has been practised with considerable skill by man from very early times. The ancient Egyptians have left many remains of cloisonné work and moulded ornaments, in which they specially excelled, as well as numerous round plated chains. The personal gold jewellery found in Egyptian sarcophagi, sometimes dating as early as 2000 B.C., includes necklaces, rings, bracelets, and hair ornaments. Both design and execution are excellent. Some of the work is inlaid with precious stones, and there are examples of filigree and of granulated gold work. Assyrian art gives plentiful evidence of the existence of the goldsmith's art among that people, but the actual remains hitherto discovered have been slight. The same may be said of Crete. Phœnician goldwork has been found in considerable quantities in Cyprus and Sardinia. Among its distinguishing features are delicate filigrees of gold wire on a gold ground, the use of grain ornaments, relief, and inlaid

work, while the articles include all kinds of jewellery for personal adornment, as well as weapons, etc. Early Greek jewellery is chiefly of pure gold, usually beaten very thin and delicately ornamented with filigree or granulated work. Greek filigree work from the sixth to the third century B.C. shows this art in its highest perfection. Other distinguishing features are fretwork, wave ornament, and the guilloché, and the work is more notable for its exquisite workmanship than for any marked individuality in design and treatment. Etruscan goldwork is directly derived from the Greek, and at its best is scarcely distinguishable from it, being particularly good in filigrees and granulated surfaces. The later Etruscan work is more florid and diffuse than good Greek designs. Roman jewellery is also mainly an imitation of Greek forms, though it tends to the larger use of precious stones and of plain surfaces. The early Teutonic nations showed considerable skill in several kinds of goldsmith's work. Anglo-Saxon remains include jewels of many varieties which show filigree work, pierced gold sheets, cloisonné work, and beaded and twisted gold. Conventionalised animal forms are largely used. The Celtic peoples, notably the Irish, were skilful and artistic workers in gold. The 'Tara brooch' is a very famous example of Irish work, which is distinguished by the use of filigree of curiously complicated knotted designs, hammered work with repoussé details and fillings-in of enamels, etc., and chased lines. In mediæval times the goldsmith's art was highly honoured in all European countries, and, after the Renaissance, reached a very high state of perfection, particularly in Italy. Early mediæval jewellery was mainly massive and simple in design; the later examples are largely in cast work, ornamented with enamels and precious stones, bosses, and borders of filigree. A famous English example is the 'Darnley jewel.' The art declined during the seventeenth and eighteenth centuries, the traditional forms being often combined with most incongruous effects, but a revival of goldsmith's work has lately set in, with excellent results. The preparation of the gold by alloying and colouring, and the manufacture of jewellery is largely carried on in Clerkenwell (London), Birmingham, Paris, Vienna, and Berlin. Some very delicate and beautiful work still comes from Eastern countries, notably from India.

Gold Stick, the name of an officer in the royal household to whom the king in person gives the parole and

countersign, and who reports directly to the king and the Army Council, as well as laying orders issued by the Army Council before the king. The office was instituted in the reign of William IV., and is held in rotation for periods of a month at a time by the colonels of the three regiments of household cavalry.

Goldstücker, Theodor (1821-72), a German Sanskrit scholar, *b.* at Königsberg and educated at that town and at Paris. He quickly came to the front as a Sanskrit scholar and resided for some time in Berlin. In 1852 he removed to London where he became professor of Sanskrit in the University of London. He worked on a Sanskrit dictionary, but his most important work was *Panini, his place in Sanskrit Literature*, 1861. Owing to his efforts the Sanskrit Text Society was formed in 1866.

Goletta, a tn. on the Gulf of Tunis, and connected with the city of Tunis by a canal and by rail. The importance of the town as a port has been diminished by the opening of the ship canal which connects with Tunis. It is well fortified. Pop. about 7000.

Golf, originally a Scottish game of great antiquity. Other variants of the name are *goff*, *gouff*, and *gouff*, the last of which is the present Scotch pronunciation, although *goff* has become fashionable in England. The name is probably derived from a Celtic form of the Ger. word, *kolbe*, meaning 'club.' The game, however, has some slight resemblance to the old Dutch game, *kolf*, but it is not known whether the game was introduced into Scotland from Holland. Certainly, in the reign of James VI. of Scotland, the Scotch used to buy their balls and clubs from Holland, as James eventually prohibited their importation. G. was popular in Scotland as early as the fifteenth century, but its origin is suspected to be much older. In 1457 the Scottish parliament, concluded that the game was interfering seriously and with the defences of the country, ordained that 'the fute ball and golf be utterly cryit down, and nocht usit; and that the bowmerkis be maid at ilk parochie kirk a pair of buttis and schuttir be usit ilk Sunday.' Further enactments to this effect were passed during the fifteenth century, some of which show us clearly that the game, in spite of the laws, was becoming rapidly more popular every day. In fact, the king, James IV., whose enactments attempted to stop the game, nevertheless broke the law himself, and played. G. is usually called the 'royal and ancient game,' and there is much evidence to show that

it was often played by Scottish royalty. James V. was a player of note; his daughter, Mary of Scotland, is also supposed to have played. James VI. of Scotland and I. of England is held by some authorities to have been a player himself; and from the evidence quoted above he may, at any rate, be held to have been a keen partisan of the game, whilst from his reign dates the origin of the oldest of all G. clubs, the Royal Blackheath Club (1608). The famous St. Andrews Club was instituted in 1754, and the Musselburgh G. Club in 1774. An earlier foundation is the Honourable the Edinburgh Company of Golfers, with a series of minutes dating from 1744. A silver club is competed for annually, and after 1891 the Honourable Company acquired the links at Muirfield. The St. Andrews Club took the title of 'The Royal and Ancient Golf Club



GOLF, OR BANDY BALL

(From a MS. in the Douce Collection)

of St. Andrews' by the wish of King William IV., who became patron in 1834, a patronage which was continued after his death by his queen, Adelaide. The King William IV. Gold Medal, presented in 1837, is still competed for. G. began anew in England with the Westward Ho Club instituted in 1861, followed by the two Wimbledon clubs and the Liverpool Club with links at Hoylake. From the year 1880 G. seems to have thriven enormously, clubs have sprung up all over the country, and in fact, at the present day it is wellnigh impossible to go to any part of the country without finding a G. course within easy distance. There are in the British Isles very nearly 2000 clubs, with an average membership of about 300. The game has spread not only in Great Britain and Ireland, but in all the Dominions and in America, especially in the U. S. A. The total number of G. clubs in the U. S. A. is 4669, while Canada has 539, Australia 477, and S. Africa 264. G. has become popular on the Continent, especially in France, Germany, and Austria. The number of G. clubs in the world is 8534.

The Royal and Ancient Club of St. Andrew's is the governing power in G., and drew up the original rules of the game. In 1899 a standing committee was inaugurated by the St. Andrew's Club representing golfing opinion in Great Britain. In the U. S. A. G. is controlled by the U. S. Golf Association, and in Canada by the Royal Canadian Golf Association. In England, Canada, and America there are also large Professional Golfers' Associations. In America also each state has a G. Association, while Women's G. is cared for by similar Women's G. Associations. In the British Isles there are the Ladies' G. Union and the Irish Ladies' Golfing Union. One feature of G. is that there is not the disparity between the amateur and the professional which marks some games. The chief G. championships are: the Open, the Amateur and the Ladies'.

The Open Championship is played only on the following courses: St. Andrews, Prestwick and Muirfield, Hoylake, Sandwich, and Deal. The winners during the last ten years have been: G. Duncan (1920), J. Hutchinson (1921), W. Hagen (U. S. A.) (1922), A. G. Havers (1923), W. Hagen (U. S. A.) (1924), J. Barnes (U. S. A.) (1925), R. T. Jones, jr. (U. S. A.) (1926 and 1927), W. Hagen (U. S. A.) (1928 and 1929), R. T. Jones, jr. (U. S. A.) (1930), T. D. Armour (U. S. A.) (1931).

The Amateur Championship was instituted in 1886, the winners during the last ten years being: C. Tolley (1920), W. Hunter (1921), E. W. Holderness (1922), R. Wethered (1923), E. W. Holderness (1924), R. Harris (1925), J. Sweetser (U. S. A.) (1926), W. Tweddell (1927), T. P. Perkins (1928), C. Tolley (1929), R. T. Jones, jr. (U. S. A.) (1930), E. Martin Smith (1931).

The winners of the British Women's Open Championship in the last ten years have been C. Leitch (1920 and 1921), J. Wethered (1922), D. Chambers (1923), J. Wethered (1924 and 1925), C. Leitch (1926), S. La Chaume (1927), L. Le Blau (1928), J. Wethered (1929), D. Fishwick (1930), Enid Wilson (1931).

Winners of the American Open Championship: E. Ray (1920), J. Barnes (1921), C. Sarazen (1922), R. T. Jones, jr. (1923), C. Walker (1924), W. Macfarlane (1925), R. T. Jones, jr. (1926), T. Armour (1927), T. Farrell (1928), R. T. Jones, jr. (1929 and 1930), W. Burke (1931).

Winners of the American National Amateur Championship:—C. Evans, jr. (1920), T. Guilford (1921), J. Sweetser (1922), M. R. Marston (1923), R. T. Jones, jr. (1924 and

1925), G. Von Elm (1926), R. T. Jones, jr. (1927 and 1928), H. R. Johnston, jr. (1929), R. T. Jones, jr. (1930).

Winners of the American National Women's Amateur Championship:—A. Stirling (1920), M. Hollins (1921), G. Collett (1922), E. Cummings (1923), D. C. Hurd (1924), G. Collett (1925), G. Stetson (1926), M. Horn (1927), G. Collett (1928, 1929, and 1930).

Before the War, the British Open Championship was mostly in the hands of the three famous professional players, J. H. Taylor, J. Braid, and H. Vardon. Taylor won the open championship in 1900, 1909, and 1913; Braid in 1901, 1905, 1906, 1908, and 1910; and Vardon in 1903, 1911, and 1914. Another celebrated golfer of this period was the Frenchman, A. Massy, who won the British Open in 1907 and tied with Vardon in 1911. G. Duncan and Abe Mitchell are the most notable successors to those great players.

The Game.—Briefly, the game consists in hitting a ball by means of clubs over a certain amount of country into a hole some 4 in. in diameter, and about 6 in. deep. The final act of hitting the ball on the 'green' into the hole is called 'putting.' A course usually consists of either eighteen or nine holes, each of which are at a distance of some 100 to 500 or 600 yds. distance from one another, and each hole is usually marked by a flag. The game is commenced by 'teeing' the ball, i.e. by placing it in a position of advantage from which it can easily be driven, usually on the top of a small mound of sand. After 'driving' the ball from the tee it must not again be touched by the hands or placed in any special position save as the rules of G. allow under special circumstances. The game now consists of playing your ball with one or other of the variety of G. clubs until you 'putt' it into the 'hole,' after which it is taken to the next tee and driven off again in the direction of the next hole. The use of a variety of G. clubs is necessary to surmount 'bunkers,' and also because the 'lie' of the land is not always of a sufficient equality to allow of the continual use of the same club. It is to a very great extent this variety which gives so much charm to the 'royal and ancient game.' At the end of the round that player is held to be winner who has succeeded in 'holing out' in the least number of strokes on the most occasions. A game may, however, be decided before the round of the links has been actually finished, since if at the seventeenth tee a player is 3 to the

good it is impossible for his opponent to win, and the score would be called 3 up and 2 to play. Since the game became popularised many changes have been made in the clubs used, and many additions have been made to them also. In the matter of balls used great progress has been made, and the change from the guttapercha ball to the ball with an india-rubber or soft core has done much to make the game easier for the casual player. It is impossible to give here a definition of all the technical terms used in G., but definitions of the principal clubs used are as follows: A *baffy*, a short wooden club used for 'lofting'; *brassy*, a wooden club shod with brass; *cleek*, an iron-headed club, which is used for driving through the 'fairway' and is capable of the largest drive of all iron clubs; *driver*, the longest driving club; *iron*, an iron-headed club used for driving or lofting; *mashie*, a short-headed iron club. The head of a *lofting mashie* is laid well back and is used for lofting short shots; *putter*, the club used for playing short shots near the hole, usually on the 'putting green.' There are in almost every case different varieties of each of the clubs mentioned. H. G. Hutchinson, *Golf* (Badminton Library), 1895; C. J. H. Tolley, *The Modern Golfer*, 1924; B. Darwin, *The Golf Courses of Great Britain*, 1925; A. Mitchell, *The Essentials of Golf*, 1927.

Golgotha, the scene of the crucifixion of Christ, being a small hill just outside Jerusalem. It has been identified with a knoll on the N. side of the city, close to the Damascus Gate, and was probably the place of public execution according to the Mosiac law. The Hebrew word G. means 'a skull,' but it is uncertain whether this refers to the shape of the hill or to the skulls of criminals which might be found there.

Goliad, a vil. in the co. of the same name in the state of Texas, U.S.A. It is situated on the N. bank of the San Antonio. It is a fairly important railway centre and has cotton mills and flour mills. It played an important part in the Texan War of Liberation. Pop. 2000.

Goliath, the champion of the Philistines who challenged the hosts of Israel to combat. David won renown by slaying this champion with a stone from his sling. This is the tradition given us in 1 Sam. xvii. Reference is made to another G. (2 Sam. xxi., and 1 Chron. xx.). In the latter this second G. is held to be a brother of the giant of the Philistines. Evidence, however, seems to prove that the story of David and G. is of late origin.

Goliath Beetle, found in Tropical and Southern Africa, and is so called from its giant size, the male of the largest variety, *Goliathus druryi*, being as much as 4 in. in length. It is a lamellicorn beetle, belonging to the sub-family Cetoniidae, and to the genus of the Scarabaeidae. Its size and velvety-black hue, often diversified with white markings, make it a splendid insect.

Golitsuin or Goltitzin (see GALITZIN)

Goliuss, James (1596-1667), a Dutch Orientalist, b. at The Hague; studied Arabic and Eastern languages under Erpenius at Leyden. In 1622 he went to Morocco on a diplomatic mission, and in 1624 succeeded Erpenius at Leyden, where he occupied the chairs of Arabic and mathematics till his death. During 1625-29 he took a tour through Syria and Arabia. He wrote numerous works on Oriental subjects, the chief being the *Lexicon Arabico-Latinum*, 1653.

Gollancz, Sir Israel (1864-1930), a professor of English literature, was educated at the City of London School, University College, London, and Christ's College, Cambridge. After a distinguished scholastic career, he acted for ten years (1896-1906) as university lecturer in English at Cambridge, and, till his death, held a similar post at King's College, London, where he was also dean of the faculty of arts. His *Cynewulf's Christ*, 1892, and *Æteler Book of Anglo-Saxon Poetry*, 1895, prove him an authority on old English texts, whilst he also brought out the *Temple Shakespeare*, 1894-96, and *Lamb's Specimens of Elizabethan Dramatists*, 1893. He was director of the Early English Text Society, Hon. Sec. of the Shakespeare Memorial Committee, and Secretary of the British Academy since its foundation in 1903. Knighted in 1919.

Gollnow, a Ger. tn. situated in the prov. of Pomerania, kingdom of Prussia. It is about 15 m. N.E. of Stettin and can best be described as a small manufacturing town. It is very old and was formerly a Hanse town. Pop. 11,000.

Golomyinka, a unique fish, the only one of its species, which in some respects resembles the gobies and which is only found in Lake Baikal, Eastern Siberia. It exudes oil from every part of its body, has no scales, and is flabby to touch. Its scientific name is *Callionymus baikalensis*, or *Comephorus*.

Golovnin, Vasily Mikhailovitch (1776-1831), a Russian sailor and vice-admiral, was b. at Gulyuki, in the prov. of Ilyazan. He was a great navigator and explored the coasts of

Kamchatka and of Alaska. In 1810 he was captured and imprisoned by the Japanese, and remained a prisoner until 1813. He then returned to St. Petersburg and planned the circumnavigation of the globe by a Russian ship. He was appointed to the command of the expedition and started in 1817, returning in 1819. He wrote, amongst other works, *Journey Round the World*, and *Narrative of my Captivity in Japan*.

Goltz, Kolmar, Baron von der (1843-1916), Ger. field-marshal and military author; b. Aug. 12, at Bielefeld, W. Prussia; son of Erhard W., Baron von der G. In 1861, 2nd lieutenant in 41st Regiment. Attended Berlin Military Academy 1864-67—serving in Austro-Prussian War, 1866; wounded at Trautenau. In 1868 placed in topographical bureau of general staff. In Franco-Prussian War, 1870-71, general staff officer in 2nd Army—at Gravelotte, Vionville, Metz, Orléans, and Le Mans. In 1871 in 8th Regiment; and became teacher in School of War, Potsdam. In Oct. 1871 he returned, as captain, to supreme general staff. In 1874, on general staff of 6th division; in 1877 in 96th Regiment. In 1878 back to supreme general staff, in War History department, as major. Taught war history at War Academy. In 1883, transferred services to Turkish Gov., for whom he conducted department of military education till 1896. Then returned to Ger. service as Lieutenant-General. Reorganised Turkish army, 1908-10. Field-marshal, 1911. General inspector of 2nd Army Corps until retirement from army, 1913. When Gers. advanced into Belgium, Aug. 1914, G. became Military Governor of that country. Went to Turkish headquarters at end of Nov.; in April 1915 took command of first Turkish army in Mesopotamia, where he fought General Townshend in December, and drove him back at Kut-el-Amara. Died at Turkish headquarters near Baghdad, April 19, 1916. Works include: *Die Operationen der II Armee bis zur Capitulation von Metz*, 1874; *Léon Gambetta und seine Armee*, 1877; *Das Volk in Waffen*, 1883 (6th ed., 1925); *Krieg und Heerführung*, 1901; *Von Jena bis Pr. Eylau*, 1907.

Goltziuz, Heinrich (1558-1617), a Dutch engraver and painter, b. at Mülbrecht, and after working for some years in Holland, made a tour through Germany and Italy in 1590, returning for the rest of his life to Haarlem. His engravings show great technical excellence, and some of his portraits are very fine. Much of his work is a slavish imitation of

Michelangelo, whom he greatly admired.

Goluchowski, Agenor, Count (1849-1921), an Austrian statesman, descended from a noble Polish family. He entered the diplomatic service, and after being secretary to the legation at Berlin became Austrian minister at Bucharest (1887-93). In 1895 he became Minister for Foreign Affairs. Although some surprise was experienced in Europe at the appointment he soon justified himself. He upheld the Triple Alliance, brought about a better understanding with Russia, practically enforced neutrality during the trouble in the Balkans, and supported Germany in the Algeiras Conference (1905). He was, however, forced by Hungarian opposition to resign in 1906.

Gomarus (or Gomar), Franz (1563-1641), a noted Protestant theologian, was educated in the faith of the Reformed Church in Germany, whence he afterwards crossed to England and graduated at Cambridge University. He became professor of theology at Leyden and opposed the teachings of Arminius. Owing to the victory of the views of Arminius, he forsook Leyden, and after an interval was appointed to the theological chair at Saumur. A posthumous work, *Lyra Davidis*, appeared in 1645.

Gomberville, Marin le Roy (1600-74), a noted Fr. author of the seventeenth century. He commenced writing at an early age, and before he had reached the age of twenty had published a book of verse and a history. His great work, *Polixandre*, appeared between the years 1632-37. He was one of the earliest members of the French Academy. Amongst his other works are *Cytheree*, and *Jeune Alcidiene*.

Gombroon, see BENDER-ABBAS.

Gomel, a tn. in White Russian S.S.R., situated 140 m. N.E. of Kiev, the nearest large town. It stands on the R. Sozh, and has a trade in timber and boat-building. It forms also an important railway junction. Pop. 80,000.

Gomera, an island situated in the Atlantic, forming part of the Canary Is. group. Its area is 140 sq. m. The island is very mountainous, and one of its chief industries is cattle rearing. Its chief port is San Sebastian. Pop. of whole island about 22,000.

Gomez, Diego fl. fifteenth century), Portuguese navigator and writer on discovery, was forgotten until his chronicle was published by Schmeller in 1847 from MS. in the State Library at Munich. In 1458, Prince Henry the Navigator equipped

the *N'ren* and two other caravels, with which G. sailed up the Gambia 'as far as Cantor.' G. was sent by King Alfonso in the same direction in 1460, when he explored the Cape Verde and Canary Islands. G. had been made receiver of customs at Cintra in 1440. In 1466 he was made a judge in that place, and his office was confirmed to him in 1482.

Gomm, Sir William (1784-1875), a British soldier, son of Lieut.-Colonel Wm. Gomm, killed at Guadaloupe in 1794. Fought in Holland under the Duke of York (1799), was with Wellington in the Peninsular War, and on Moore's staff at Corunna. Took part in most of the battles of the Peninsular War, and was one of the most trusted men of Wellington's staff. Served in the 5th British division in the Waterloo campaign. See *Letters and Journals*, published by F. C. Carr-Gomm in 1881.

Gomme, Sir George Laurence (1853-1916), statistician and archæologist, son of Wm. Laurence G. of Hammer-smith. Educated at the City of London School. At one time he edited the *Antiquary*, the *Archæological Review*, and the *Folklore Journal*. His interest in old-time customs and superstitions was early awakened; and in such books as *Primitive Folk-Moots* (1880), *Chap-books and Folklore Tracts* (1885), and *Folklore as an Historical Science* (1908), he exhibited the results of his investigations. He founded the Folklore Society, and served it in many capacities—including that of president. He entered the service of the Metropolitan Board of Works at an early age and remained therein until its supersession by the London County Council, with which he continued—being its clerk 1900-14. Besides those on folklore, published works on the history of London.

Gomorrah, see SODOM AND GOMORRAH.

Gompers, Samuel (1850-1924), American Labour leader, b. Jan. 27 at 11 Tenter St., Spitalfields, London, England; son of Solomon G., a poor Dutch Jew. Attended common schools in London from his sixth till his tenth year, and then worked for a shoemaker—but disliked the work and was apprenticed to a cigar-maker, working at the trade for three years, during which he attended evening classes. In 1863 he emigrated to the U.S.A. and there worked at cigar-making. In 1864 he began to busy himself in developing the International Cigar-Makers' Union: of which he became secretary, and afterwards president. Disapproval of the methods of the Knights of Labour

led to his helping to found, in 1881, the Federation of Trades and Labour Unions, of which he was president for three years. When this organisation was merged in the new American Federation of Labour, Dec. 1886, G. was elected president of the new body; and, with the exception of the year 1895, he held its presidency for the remainder of his life. In 1907 he and others were enjoined by a Federal court not to publish the name of the Buck Stove and Range Co. in a black-list. Disobeying, he was sentenced to twelve months' imprisonment. He was opposed to socialistic theory and usually disapproved of 'Labour' politics—nevertheless in 1908 he tried, unsuccessfully, to throw the whole strength of the Federation on the side of the Democratic party; and he ardently championed J. A. Follette, the independent candidate for President, in 1924. In the Great War, he used all his influence to get the U.S.A. to side with the anti-Ger. powers of Europe. He was member of the Advisory Committee to the Council of National Defence, 1916-19; and he visited Europe during the War. In 1919 he was elected president of the International Commission on Labour Legislation of the Paris Peace Conference. Later, he was member of the Advisory Committee to American delegates to the Disarmament Conference, Washington. He d. at San Antonio, Texas, Dec. 13.

Gompertz, Theodor (1832-1912), Austrian classical scholar; b. March 29 at Brünn; son of Philipp G., banker. Studied at Brünn, and from 1849 under Bonitz at Vienna; where he was qualified lecturer 1867. Professor-extraordinary from 1869, ordinary Professor of Classical Philology 1873-1901. During the last-named period he became widely known as a decipherer of inscriptions at Herculaneum. Works include:—*Philodemi Episcopi de ira liber*, 1861; *Demosthenes, der Staatsmann*, 1864; *Herculaneische Studien*, 1865-66; *Träumerdeutung und Zauberei*, 1866; *Neue Bruchstücke Episcopi, insbesondere über die Willensfrage*, 1876; *Die Bruchstücke der griechischen Tragödie und Cobets neueste kritische Manier*, 1878; *Herodoteische Studien*, 1883; *Über ein bisher unbekanntes griechisches Schriftsystem aus der Mitte des 4. vorchristlichen Jahrhunderts*, 1884; *Zu Philodems Büchern von der Musik*, 1885; *Zu Heraclets Lehre und Überresten seines Werkes*, 1886; *Über die Abschluss der Herodoteischen Geschichtswerkes*, 1886; *Platonische Aufsätze*, 1887-1905; *Apologie der Heilkunst. Sophistenrede*, 1890; *Lebensbilder von H. Bonitz*, 1889; *John*

Stuart Mill, 1889; *Philodem und die ästhetischen Schriften der herculanischen Bibliothek*, 1891; *Die Schrift vom Staatswesen der Athener und ihr neueste Beurtheiler*, 1891; *Die jüngst entdeckten Überreste einer Platonischen Phädonenthaltenden Papyrusrolle*, 1892; *Beiträge zur Kritik und Erklärung griechische Denker—Eine Geschichte der antiken Philosophie*, 1893-1902 (Eng. trans., 1901-12). Edited translation of Mill's collected works, Leipzig, 1869-80. Died at Baden, Austria, Aug. 29.

Gonçalves Dias, Antonio (1823-64), a Brazilian poet, b. at Caxias, Maranhão; educated in Portugal. Returning to Brazil in 1845, he at once began on dramatic and journalistic work, and in 1846 issued a volume of lyrics, *Primeiros Cantos*. This was followed by *Segundos Cantos*, *Sacrilhas de Frei Antão*, 1848, and *Ultimos Cantos*, 1851. His lyrics are marked by patriotism, love of nature, and beauty of expression.

Goncharov, Ivan Alexandrovich (1812-91), a Russian novelist; studied much but wrote little, and, unlike most of the contemporary men of letters, was a conscientious bureaucrat, indifferent to all the political and socialistic propaganda of the revolutionists. For some time he held a position in the ministry of finance at St. Petersburg, and later (1856) visited Japan as Admiral Putiatin's secretary, utilising his experiences abroad in *The Frigate 'Pallada'*. Besides translating Schiller and Goethe, he published, in 1847, his *Oblomov novennaya Istoria* (A Common Story), but it is his novel *Oblomov*, 1857, which has made his name illustrious. So vivid is the picture which he here gives of the idle lives of the landed gentry that Dobrolubov pronounced the country home of the Oblomovs to be 'our fatherland.'

Goncourt, Edmund Louis Antoine Huot de (1822-96), and his brother, **Jules Alfred Huot de** (1830-70), Fr. men of letters, established a unique and lasting literary partnership. They were both endowed with a hypersensitiveness to the minutest details of existence, and a feverish and wholly extravagant conception of the influence of those details and of what may be called the purely physical and material environment upon the trend and bias of a human life. Their theories as to novels and composition in general may be studied at length in the nine volumes of their *Journal* (published 1887-96), but the practical working of these theories may be best appreciated in their novels, especially in their masterpiece, *Madame Germaine*, 1869. So personal and un-

sparing was the analysis of emotion and incident in this work that it may be considered with truth to have been written with their life-blood. Other of their joint productions in the sphere of fiction were *Sœur Philomène*, 1861; *Renée Mauperin*, 1864; and *Manette Salomon*, 1865; whilst the elder brother alone wrote *La Fille Elisa*, 1878, which attained a remarkable popularity, and *Chérie*, 1884. It is an apt similitude to speak of their novels as 'picture-galleries, hung with pictures of the momentary aspects of the world.' For they strove, not like Flaubert to present the grand unity which binds the most conflicting minutiae of daily life, but rather to depict the kaleidoscopic character which it possesses at the very moment of living, when the smallest things are magnified and there is none but the crudest perspective. Such an ambition entailed the most elaborate and lively knowledge of the period (the eighteenth century) about which they wrote, and this they procured by many years' untiring research into old letters, documents, and records, which but for their efforts would undoubtedly have remained in the oblivion into which they had already fallen. Their books, therefore, will be store-houses for the historians of the future, and the fineness of their miniature painting of the modes and manners of their chosen period, as it is displayed in *Portraits intimes du XVIII^e siècle*, 1856-58, and *L'Art du XVIII^e siècle*, 1859-75, etc., will long remain an object of wonder and admiration to their posterity as it was to their contemporaries.

Gonda, the name of a tn. and dist. in the United Provinces, India. The tn. is an important railway junction, and has a pop. of 15,800. The dist. has an area of nearly 3000 sq. m. and consists of a huge plain, which is remarkable for its fertility. Its population is about 1,500,000.

Gondal, the name of an Indian native state in the Bombay Presidency. It has an area of 1024 sq. m., and a population of over 160,000. The main products are cotton and grain, and it has for long been noted as an extremely progressive state. Female education has lately been made compulsory. It possesses a college, an orphanage, a girl's high school and an asylum. It is connected with the sea-board by rail. The chief town is G., which has a population of nearly 20,000.

Gondar, a tn. of Abyssinia, about 20 m. N. of the Lake Tsana. Was formerly a flourishing and well-populated town of the prov. of Dembea, but was practically laid waste by King Theodore. Its population is

slowly dwindling; was 30,000, is about 3000.

Gondokoro, a vil. of the Eastern Sudan, on the E. bank of the upper Nile. It is a gov. station, and its population is composed chiefly of British military and civil officials, with a small number of natives. It is extremely unhealthy. It was named Ismailia by Sir Samuel Baker. It is practically at the end of the navigable course of the R. Nile, and owes to this fact much of its importance as a trading station.

Gondola, the name given to the craft used since the eleventh century for the conveyance of people along the canals of Venice. Gs. are long, narrow



[Canadian Pacific

GONDOLAS ON THE GRAND CANAL,
VENICE

flat-bottomed boats, measuring 30 ft. by 4 or 5 ft., whose prow and stern rise high above the water and taper to a point. The gondolier stands on his 'poppa' in the stern and skilfully propels the boat with graceful, broad sweeps of his single oar. Usually there is in the centre a 'felze' or cabin, low, and curtained. Once the Gs. were gaily-painted and decorated with Oriental silks and rich embroideries, but since the sumptuary laws of the sixteenth century they have been quite black and altogether very different from the splendid craft of Carpaccio's pictures.

Gondomar, Diego Sarmiento de Acuña (1567-1626), a Spanish diplomatist, began life as a soldier and in 1584 helped to beat off Drake from

the coasts of Bayonne. From 1613 to 1618 and again from 1619 to 1622, he was Spanish ambassador in England, during which periods he boasted that he saved many Roman Catholics from imprisonment and persecution, and undoubtedly was largely responsible for Raleigh's execution. By astute flatteries he gained the goodwill of King James and exerted his whole influence in vain to further the Spanish marriage.

Gonds, The, a Dravidian and aboriginal tribe of India, who to-day do not exceed 1,500,000, though once (from the sixteenth century to the invasion of the Mahrattas in 1741) they ruled a large tract of the central provinces, which was named after them Gondwana. They probably arrived in India with the other Dravidians from the N.W., perhaps from the Iranian highlands, at some very remote period. They are non-Aryans, but the upper classes are no longer a pure race, having intermarried freely with their Hindu neighbours. A G. has a very dark skin, with black, curly hair; his skull is described as dolichocephalic, and his nose is flat and broad. Although many have adopted Hinduism, the Gs. continue to propitiate the evil spirits which swarm in every river, rock and tree. The purer, simpler hill-tribesmen content themselves with a waist-cloth as the one article of dress, although the young folk are fond of adorning their bodies with all manner of trinkets.

Gonfalon (derived from Old High Ger. *gund-fano*, war-flag), variously used in the Middle Ages for a banner or standard. Sometimes it was just a pennon fastened to the head of a knight's lance, but in religious processions and state functions it was a rectangular banner with numerous streamers. In Florence the 'gonfaloniere' were civic dignitaries.

Gongora, a genius of orchidaceous plants, contains well over one dozen species, all of which are epiphytic and occur in wild tropical America.

Gongora, Luis de Góngora y Argote (1561-1627), a Spanish poet, studied law at Salamanca. His early works are marked by a truly poetic vein and a pleasing purity of style: they include ballads, odes, lyrics, and religious poems. Finding, however, that poetry afforded a poor livelihood, G. became a priest in 1604, and proceeded to develop and elaborate a most affected and somewhat euphuistic style of composition. Thus his *Polifemo*, *Solidades* (Solitary Thoughts), and *Pyramo y Thisbe* are overlaid with stilted metaphors, grotesque Latinisms, and pompous phraseology, so much so that this new style was labelled Gongorism, or

'stilo culto,' in reference to its pedantic mannerisms.

Goniometer (from Gk. *γωνία*, angle, and *μέτρον*, measure), an instrument for measuring the angles between the faces of crystals. There are two kinds—the contact G. and the reflection G. The former is used at the present day for the approximate measurement of large crystals. The latter is an instrument of great precision, and is used for the accurate measurement of the angles between the faces of small crystals. The faces must be smooth and bright so that they reflect sharply-defined images of a bright object. By turning the crystal about an axis parallel to the edge between two faces, the image reflected from a second face may be brought into the same position as that formerly reflected from the first face. The angle through which the crystal has been rotated is the angle between the normals to the two faces.

Gonorrhœa, a definite disease of the mucous surfaces due to a bacillus, the *gonococcus*. It is classed as a venereal disease. G. attacks the young and innocent in various and manifold forms. The eyes of babies may be affected at, or a few hours after, birth. The eyes become red, inflamed, and weeping, and unless energetically treated blindness for life may result. A large proportion of the inmates of asylums for the blind are furnished by these innocent victims. As G. is a contagious disease, should it obtain a footing in schools and institutions, a considerable number run the risk of being affected by the incidents of daily life. In later life it is apt to contaminate the blood, and attack the joints, producing a particular form of rheumatism. It may affect the heart, causing ulcerative endocarditis, an extremely fatal complication. The lining of the brain, causing meningitis, or the substance of the spinal cord may be involved, the result of which is seen in an extremely rapidly progressing paralysis. The treatment of babies should be prompt and energetic, with the object of saving the sight, whenever the eyes are affected. Parents and nurses should at once report any trouble, so that the cases may be treated and the infection of others avoided. In older patients, suspected cases should be promptly and skillfully treated, until the disease is thoroughly eradicated.

Gonsalvo di Cordova, whose correct title was **Gonzalo Hernandez y Aguilar** (1453-1515), a Spanish conqueror, was awarded a large estate as the result of the favourable treaty he concluded with Abu Abdallah, better known as Boabdil, king of the

Moors, after a prolonged contest with Granada, the Moorish stronghold. In 1498 he was honoured with the title of Duke of Saint Angelo, because, with the co-operation of Ferdinand II. of Naples, he had effectively driven the French out of Italy. In 1500 'El Gran Capitan,' as he was called, rescued Cephalonia and Zante from the Turks and gave them back to Venice, and finally in 1503, after many vicissitudes and some reverses, gained a conspicuous victory over the French near the Garigliano, securing Naples and Gaeta to the Spaniards. His enemies did not allow him long to enjoy his viceroyalty of Naples; for he was early recalled home where he suffered neglect and some disgrace.

Gonzaga, the name of a princely family in Italy, founded by Louis G. who was captain of Mantua, and in 1328 murdered the tyrant of that city. His descendants ruled Mantua till 1708, when Ferdinand-Charles IV. of Gonzaga was deprived of the duchy of Mantua because he had assisted Louis XIV. in the War of the Spanish Succession. The last descendant in the direct line from Louis was Vincent II. of Gonzaga, who became a cardinal. John Francis of Gonzaga (1394-1444) was the first Marquis of Mantua and Frederick II. of Gonzaga (1500-40) was the first duke. Frederick played a great part in history, and it was he who annexed Montferrat, which was elevated to a duchy in the reign of William of Gonzaga (1536-87). One branch line was established by a son of the Frederick II. mentioned above. Its members were Dukes of Mantua, Nevers, and Montferrat until all but Mantua was sold by Charles III. of Gonzaga (1629-65) to Cardinal Mazarin. A second collateral branch ruled Guastalla from 1541, when the Emperor Charles V. gave it to Ferdinand of Gonzaga (1507-57), until 1746 when Queen Elizabeth of Spain took possession of the duchy during the reign of the foolish Joseph of Gonzaga. The general policy of the Gs., many of whom were enthusiastic patrons of art and learning, was to support and promote the imperial interests.

Gonzaga, Luigi, a member of the Castiglione branch of that family, called also St. Aloysius (1568-91), received his education in Florence, Mantua and Rome. Although entitled to the marquise of Castiglione, he allowed his brother to adopt the title, and 1585 became a Jesuit. His death was due to plague, with which he became infected after his devoted ministrations to the sick during a serious epidemic at Rome. In 1621 he was beatified for his good

works, and in 1726 he was enrolled in the canon of saints.

Gonzaga, Thomas Antonio (1747-93), a Portuguese poet, *b.* in Oporto, but passed his boyhood at Bahia, where his father was a magistrate. Educated at home at the university of Coimbra, he returned to Brazil after some years' absence, and after holding public appointments at Villa Rica, eventually (1786) succeeded his father as 'disembargador' of the appeal court in Bahia. On the eve of his marriage with Dona Maria de Seixas Brandão, for whom he had conceived a romantic attachment, he was arrested for alleged complicity in a republican conspiracy, and was banished for ten years to the coast of Mozambique, where fevers undermined his health and intellect. He is cherished as the Portuguese Petrarch, for his *Marilia de Dirco* breathes the strength and beauty of love story. This booklet, which has a pastoral setting modelled on Theocritus, is treasured by his compatriots almost as highly as the poetry of Camoens, and in the temple of erotic poetry has been set on a pinnacle higher perhaps than it intrinsically deserves.

Gooch, Sir Daniel, Bart. (1816-89), an English mechanical engineer, *b.* at Bedlington in Northumberland. At the age of fifteen he began to work at the Tredegar Ironworks, Monmouthshire. In 1837 he was appointed locomotive superintendent to the G.W. Railway. In 1864 he interested himself in the laying of a telegraph cable across the Atlantic, for which he was created a baronet.

Good, John Mason (1764-1827), an English physician and author, *b.* at Epping in Essex. In 1784 he practised as a surgeon, but moved to London in 1793, with the view of obtaining literary employment. He published various poems, translations, and professional treatises. Among the translations are: *The Song of Songs*, from the Hebrew, 1803; *The Nature of Things*, from Lucretius, 1805, and *The Book of Job*, 1812. He *d.* in London. For his life and writings consult Gregory (London, 1828).

Good-conduct Pay, additional pay granted to privates, second corporals, and bombardiers in the British army for good conduct, as proved by the absence of entries in the regimental defaulters' book. One extra penny per diem is granted after two years' service without an entry, a second after six years, a third after twelve, a fourth after eighteen, and others at intervals of five years. Each penny is awarded together with a good conduct badge, to be worn on the left sleeve. One badge and penny is forfeited for each entry in the defaulters'

book, and all are forfeited by desertion or offences calling for court-martial.

Good Friday, the name applied by the Roman Catholic and Anglican Churches to the Friday before Easter, sacred as commemorating the anniversary of the Crucifixion. The word most likely arose from 'God's Friday' originally. In the Roman Church the ritual is marked by many special features: the altar and priests are vested in black, the only day this colour is permitted; a wooden clapper is substituted for the bell at the elevation of the host; the priest recites a prayer for all classes, orders and ranks in the church, and even for heretics, pagans, and Jews. Then follows the 'adoration of the Cross.' The black covering is removed from the crucifix, and the entire congregation approach, and upon their knees kiss the feet of the figure. In the Greek Church the fast is very strictly kept. In the Lutheran Church the organ is silent. The Anglicans hold a three hours' service, consisting of prayers, and addresses on the 'seven last words from the Cross.'

'**Good Hope**,' the name of a British cruiser of 14,000 tons which was launched in 1901 at Fairfield.

Good Hope, Cape of, *see* CAPE OF GOOD HOPE.

Goodrich, Samuel Griswold (1793-1860), an American author, whose pen-name was 'Peter Parley.' He edited an annual called *The Token* from 1828 to 1842, to which he contributed tales, poems, and essays. Most of his publications, of which there are over 200, were written for the young, and deal with history, geography, travels, and natural history. Many books of his became popular in Great Britain. *See* his *Recollections of a Lifetime* (2 vols., New York), 1857.

Goodsir, John (1814-67), an anatomist, *b.* at Anstruther in Fife; he studied at St. Andrews University, from where he served an apprenticeship to a dentist. In 1839 he published an essay on the teeth, and the next year he became keeper of the museum of the Royal College of Surgeons. His important memoirs on secreting structures, and on the human placenta are still of value. He gained a wide reputation as an anatomical teacher in the university of Edinburgh. *See* Professor Turner, *Memoirs*, 1868.

Goodwill, the advantage or benefit acquired by an establishment or business beyond the mere value of the capital, stock-in-trade, and funds employed in it, which it receives from constant or habitual customers, whether by reason of the quality of

the goods sold, the local position of the establishment, the skill, reputation, or personality of the proprietor, or any other reason that popular favour may assign. It is the expectancy of the continuance of such advantage or benefit that constitutes the market value of G. In the absence of express stipulation, the transfer of G. leaves the vendor free to compete with the purchaser of his business, provided he does not hold himself out to be still carrying on the old business. It is a settled principle of law that upon the sale of G., the vendor must not solicit the old customers to cease dealing with the purchaser, but he may deal with such persons if they choose to come to him unsolicited, and the vendor may publicly advertise his business. Where a partnership is being dissolved, any partner may require that the G. may be sold together with the other partnership assets, and he may restrain the other partner or partners from doing anything in the meantime to prejudice the value of the G., as *e.g.* by using the partnership name. G. may be mortgaged, assigned, or taken in execution (*q.v.*), except where merely personal, as where it is constituted by the ability and skill of the proprietor.

Goodwin, John (c. 1594-1665), an English Nonconformist divine, *b.* in Norfolk, and educated at Queens' College, Cambridge. From 1633-45 he was vicar of St. Stephen's, Coleman Street, but was rejected from this living for attacking Presbyterianism, and set up an independent congregation. In 1649 he issued a pamphlet *Might and Right Well Met*, in which he upheld Cromwell's army against the parliament. He also wrote *Anti-Cavalierism*; *Redemption Redeemed*; and the *Triumviri*, 1658. *See* T. Jackson, *Life*.

Goodwin, Thomas (1600-80), an English divine of the later Puritan period, *b.* at Rollesby, Norfolk; studied at Cambridge, and became a fellow in 1620. In 1625 he was licensed a preacher of the university, and three years later became lecturer of Trinity Church, Cambridge, and was presented the vicarage by the king in 1632. Harassed by the interference of his bishop, he resigned his living and retired to Holland, where he was pastor to the English church at Arnheim. In 1640 he returned to London and ministered to a small congregation in St. Dunstan's-in-the-East, where he rose to considerable eminence as a preacher. In 1643 he was elected a member of the Westminster Assembly, and frequently preached before the House of Commons by appointment. He rose

high into favour with the Protector, and ultimately became somewhat prominent among his more intimate advisers. Five volumes of his works were published at London (1682-1704).

Goodwin Sands, a range of exceedingly dangerous shoals in the Straits of Dover, extending off the S.E. coast of England, co. of Kent, about 7 m. E. of Deal. Large level patches of sand are left dry when the tide recedes and afford a firm foothold, so that cricket has often been played upon them. When covered the sands are shifting and may be moved by the prevailing tide to such an extent as to change considerably the form of the shoal. The roadstead, termed 'the Downs,' lies between them and the mainland. In length they extend for about 10 m. The shoal is divided into two principal parts, N. and S., between which is the deep inlet of Trinity Bay. A great number of wrecks have taken place on these dangerous shoals, among the most notable the loss of thirteen men-of-war in one night. Near here the Dutch won a naval victory over the English in 1652.

Goodwood, the seat of the Duke of Richmond and Gordon in Sussex. Its park is famous for cedars and other trees, which, in 1754, included 30 different kinds of oaks, and 400 different American trees and shrubs. Racing was established in 1802, but its importance (since 1825) was due to Lord George Bentinck's exertions. The races are held annually in the park during the last week of July.

Goodyear, Charles (1800-60), an American inventor, b. at New Haven, Connecticut. As an iron manufacturer he failed in 1830, but he next turned to india-rubber. After suffering great poverty and ridicule, he patented, in 1844, a process of vulcanising rubber. This process he later perfected until he required sixty patents to secure his inventions. He received medals in London (1851) and Paris (1855), as well as the Cross of the Legion of Honour. See *Pierce, Trials of an Inventor* (New York), 1866; and Parton, *Famous Americans of Recent Times* (Boston), 1867.

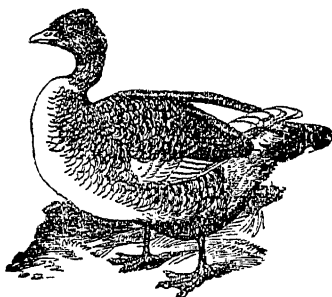
Gooze, Barnaby (1540-94), a poet, b. at Alvingham, Lincoln. He studied both at Christ's College, Cambridge, and at New College, Oxford, then travelled on the Continent, joining on his return his relative, Sir William Cecil, and becoming one of the gentlemen-pensioners of Queen Elizabeth. He was a friend of George Turberville and imitated his style and the metres of his poems. His best-known works are a series of eight eclogues and his *Cupido Conquered*.

A collection of his works was published in 1871 by Edward Arber.

Goole, a tn. in W. Riding, Yorkshire, on the R. Ouse. It is one of the chief river ports in the United Kingdom, as it possesses extensive docks, which are annually entered and cleared by some 5000 vessels of more than 1,250,000 tons burden. Amongst the imports are shoddy, for manufacturing purposes, oil, logwood timber, champagne, farm-produce, and groceries. The chief exports are coal, stone, machinery, woollen goods and cotton. The principal industries are the manufacture of alum, sugar, rope and agricultural implements. Shipbuilding is also carried on and there is a large dry dock. Steamship services to European ports are worked in connection with the L. & N.E. Railway. Pop. (1921) 19,111.

Goorkhas, see *GHURKAS*.

Goose, the name given to all the birds belonging to the genus *Anser*, of the Anatidæ, or duck family; there are about twelve species, which occur in the Nearctic and Palearctic regions.



GOOSE

They are characterised by a slightly hooked beak, high at the base; short, webbed feet; and legs placed further forward than in the case of other Anatidæ. Geese live entirely on grass and other herbage, and are more at home on land than on water, as they swim very little and never dive. *A. cinerius*, the graylag G., is the only species which nests in Great Britain, and is the parent of the domesticated breed; it is found in the W. of Scotland and in the central counties of Ireland. *A. albifrons*, the laughing-G., *A. segetum*, the bean-G., and *A. brachyrhynchus*, the pink-footed G., are among the species which travel to Great Britain. Geese were domesticated at an early age, and are valued for their quills and feathers

as well as for their flesh. Large numbers are bred in Lincolnshire, and more are imported from Holland and Germany. Strassburg geese having the widest reputation. Embden geese, remarkable for their whiteness, and Toulouse geese, are two of the best-known domesticated varieties.

Gooseberry, or *Ribes grossularia*, a species of Saxifragaceæ, closely allied to the red, black, and flowering currants. It is indigenous to Britain and other European regions of cool temperature, as well as to N. America and W. Asia. The name G. is supposed to have arisen from the fruit having been made into a sauce and used for young geese. The shrubby plant is very largely cultivated in Britain for its acid fruits, and it is usually propagated by means of cuttings. It is very hardy, and with good pruning and exposure to the light it will grow in almost any garden; the flavour is best, however, where the low temperature of the N. brings the fruit more slowly to maturity than is the case in the S. The Cape G. is a species of Solanaceæ, known in botany as *Physalis peruviana*, and it bears also the popular names of strawberry tomato and G. tomato.

Goose-fish, a popular name for *Lophius piscatorius*, the angler fish.

Goossens, Eugène (b. 1893), Eng. conductor and composer, b. in London, son of Eugène G., a Belgian b. in France and long settled in England. Won a scholarship at the Liverpool College of Music in 1906 and studied under Sir Charles Stanford and Dr. Woods at the Royal College of Music, London. Played in Sir Henry Wood's orchestra and in the Philharmonic string quartet. Between 1915 and 1920 associated with Sir Thomas Beecham. First notable appearance as a conductor in 1916, when he directed Stanford's *The Critic*. In 1921 he formed his own orchestra, which established his reputation as one of the leading modern conductors. Has conducted British National and Carl Rosa Opera companies, Russian Ballet and London Symphony Orchestra and, in the U.S.A. in 1923, the Symphony Orchestra at Rochester. As a composer he first attracted attention in 1915, with *Five Impressions of a Holiday*, a trio for piano, flute, and cello. This was followed in 1916 by the *Rhapsody* and two sketches, *By the Turn* and *Jack o' Lantern*, which are his most frequently played works. Often changed his style, as with the *Kaleidoscope* (1918) and the symphonic poem *The Eternal Rhythm* (1920), but critics point out that the changes are tem-

peramental rather than methodical, and represent the partial absorption of older teaching, but always with personal expressiveness. It is also said that his work reveals a cold brilliance with an absence of deep emotion; but his harmonic sense is keen and his style generally is European rather than Eng.

Gopher (*Testudo polyphemus*), a land tortoise occurring in the S. states of America. It does great damage to potato crops, upon which it feeds: the flesh is considered excellent eating. G. is more commonly applied to certain small rodent mammals.

Göppingen, a tn. in Germany, in the kingdom of Württemberg. It possesses a castle, built partly with stones from the ruined castle of Hohenstaufen, a mineral spring, and many manufs., machine shops, and tanneries. Pop. 22,000.

Gorakhpur, a div. and tn. of the N.W. provinces of British India, bounded on the N. by Natal, and S. by Gogra R. It is intersected by numerous rivers and lakes well stocked with fish. The tiger is found in the N., and many other wild animals abound. The chief productions are cotton and rice. Buddha died within the district of G., and it became the headquarters of the new creed. During the Mutiny of 1857 it was lost for a short while, but under the friendly Gurkhas the rebels were driven out, and the whole district once more passed under British rule. Pop. tn. 58,000; div. 6,720,000.

Gorboduc, or *Ferrex and Porrex*, the earliest regular Eng. tragedy, written in collaboration by Thomas Sackville, Thomas Norton, and Lord Buckhurst, and played before Queen Elizabeth on Jan. 13, 1561, by the gentlemen of the Inner Temple hall. It was published in 1565 and again in 1570.

Gorchakov, or *Gortchakov*, a Russian family of noble and anct. descent:

Prince Audrey Ivanovich (1768-1855), a famous general of the Russian army, who played an active and important part in the final Napoleonic campaigns.

Alexander Ivanovich (1769-1825), celebrated for the part which he played in the wars with Turkey and later against Napoleon.

Peter Dimitrievich (1790-1868), served in the later campaigns against France. He was afterwards of great use to the Russians in quelling the revolts in the Caucasus, and in the war of 1828 he fought against the Turks. When the Crimean War broke out he offered his services and was present at the battles of Alma and Inkermann. In 1855 he retired.

Prince Mikhail Dimitrievich (1795-1861), brother of Peter, took part in the campaign against France (1812-15) and in the Turkish War of 1828. He fought also in the Polish campaign of 1830, and by his signal services gained much distinction. When war broke out with Turkey in 1853, he was made commander-in-chief of the Russian forces in Moldavia and Wallachia, afterwards commanding the Russian forces in the Crimea. He conducted the defence of Sebastopol with great skill. In the following year he became governor of Bland, where he died.

Prince Gorchakov Alexander Mikhailovich (1798-1883), a Russian statesman. Received a sound education in Russia, and on the completion of his education entered the Foreign Office. He early distinguished himself in diplomatic circles, and quickly became the leading Russian diplomat. He was appointed Russian minister in 1850, when the Ger. confederation was formed, and was next sent as minister to Vienna. He was at Vienna during the Crimean War. He counselled the ending of that war when he saw that Russian objects could not be gained by prolonging it, and he shortly afterwards became Minister for Foreign Affairs. His attitude as minister was bold and firm, and he was rewarded by being made Chancellor of the empire. An understanding between Russia and Prussia now gave the Prussians their opportunity of becoming omnipotent in Germany and of crushing France. He now aimed at regaining for Russia what she had lost by the Treaty of Paris (1856), and by the Treaty of San Stefano seemed to have done so, but the Congress of Berlin caused Russia to make many concessions. He regained for Russia, however, Bessarabia which she had previously lost. He resigned his post as Minister for Foreign Affairs only the year before his death. As a foreign minister he was one of the firmest and strongest in Europe, and that in an age of diplomatic giants.

Gordian Knot, see **GORDIUM**.

Gordianus, **Marcus Antonius Africanus** (A.D. 168-238), a Rom. emperor. He was the son of Metius Marcellus, through whom he traced his descent from Trajan. He governed Africa for many years as proconsul, and at the age of eighty was proclaimed emperor by the troops who had rebelled against the tyrannical rule of Maximinus. His young son was killed in battle, and G., overwhelmed with grief, committed suicide at Carthage after a reign of two months.

Gordianus, **Marcus Antonius Pius**

(A.D. 238-44), a Rom. emperor, the grandson of G. Marcus Antonius Africanus, was b. about 226. He was proclaimed emperor by the troops after the murder of Balbinus and Pupienus. He defeated the Goths in Mæsia and waged war against Sapor, King of Persia, from whom he captured many cities. He was assassinated in Mesopotamia by Mithreus, his father-in-law and chief general.

Gordium, an anct. city of Phrygia near the Sangarius, on the Persian 'Royal Road' from Pessinus to Ancyra. It was here that, according to legend, Alexander the Great cut with his sword the G. knot which bound the yoke to the pole of the wagon of Gordius, the peasant king of Phrygia. This act was supposed to fulfil a prophecy which declared that whosoever should undo the knot would be king of all Asia.

Gordon, the name of a famous Scottish family called after the lands of G. or Gorden in Berwickshire, and tracing its lineage to the thirteenth century. The first dependable traces of the family belong to the fourteenth century, when Sir Adam, in whom were united the G. and Huntly branches of the original family, took a prominent part in the struggle for independence. Sir Adam at first sided with the Eng., but after the battle of Bannockburn he joined the party of Bruce and was rewarded for his adherence with the lordship of Strathbogie in Aberdeenshire. Thus the chief seat of the family was transferred from Berwickshire to Aberdeenshire. Sir Adam had two sons, Adam and William. From the younger son, William, sprang the Galloway, Irish, and Virginian branches of the stock. Sir Adam G. who was killed at Homildon Hill in 1403 was the grandson of the elder and brought the direct male line to a close; but two other grandsons (of illegitimate birth) continued the tradition, viz. Jock of Scurdargne (d. 1394), from whom the Earls of Aberdeen claim descent, and Tam of Ruthven, from whom many of the N. families are derived. Though the direct male line was brought to an end in 1403, Sir Adam left a daughter, Elizabeth. Elizabeth married Sir Alexander Seton and inherited the barony of the G. and Huntly lands in Berwickshire and the barony of the G. lands in Aberdeenshire. From this marriage sprang the Seton-Gs. or the Dukes of G. Their son Alexander was made Earl of Huntly in 1446, and subsequently Lord of Badenoch. By marriage he fell heir to the baronies of Cluny, Aboyne, and Glenmuick. He was succeeded by his second son, George, who married the daughter of

King James I. and who acquired the lands of Schivas, Boyne, Enzie, and Netherdale. The third successor to the title was his son Alexander, who augmented his territory by the lands of Strathaven and the Brae of Lochaber. He fought with distinction at Flodden. The fourth earl was his grandson George, who fell heir to the earldom of Moray. He thus became the wealthiest and most powerful of Scottish landholders—so powerful that the sovereign fearing usurpation deprived him of the earldom of Moray. The earl, incensed, headed an insurrection, but was defeated and slain at Corrichie in 1562. His son George succeeded as fifth earl, and was in turn succeeded by his son George as sixth earl, a champion of Catholicism. He worsted the king's forces at Glenlivet, but was granted pardon and created Marquis of Huntly in 1599. His son George, the second marquis, was a fervent royalist and was executed at Edinburgh in 1649. His son Lewis, the third marquis, was reinstated by Charles II. George, fourth Marquis of Huntly, was created Duke of G. in 1684. A Catholic by persuasion, he was appointed by James II. keeper of Edinburgh Castle. He submitted to George I., but being suspected of Jacobite sympathies was forced to reside on parole in Edinburgh. He was succeeded by his son Alexander, the second duke, who associated himself with the Old Pretender, but was pardoned on his surrender of G. Castle in 1716. He died in 1728 and was succeeded by his son, Cosmo George, as third duke, who died in 1752. Lord Lewis G., his brother, was one of the chief promoters of the Jacobite rebellion in 1745. Another brother was General Lord Adam G., who was commander of the Scottish forces in 1782 and governor of Edinburgh Castle in 1786. Cosmo George, the third duke, left three sons. Alexander, the eldest and the fourth duke, is remembered as being the author of the popular song, *Cauld Kail in Aberdeen*; the youngest, Lord George (*q.v.*), was leader of the 'No Popery' riots of 1780 and died in Newgate in 1793. Alexander, the fourth duke, had married the beautiful Jane Maxwell, known as the 'beautiful Duchess of Gordon,' and their son George succeeded as fifth duke. The fifth duke raised the famous corps now called the second battalion of the G. Highlanders. He died without issue in 1836, and the title with the earldom of Norwich and the barony of G. Huntly became extinct. The title of Marquis of Huntly passed to his cousin and heir-male, George, fifth Earl of Aboyne. Lady

Charlotte G., daughter of the fourth duke and wife of Charles Lennox, fourth Duke of Richmond, had a son, Charles, who became heir to the estates and called himself G.-Lennox. Elizabeth, Duchess of G., widow of the fifth duke, was a woman of great strength and sweetness of character. The dukedom of G. was revived in 1876 in favour of the sixth Duke of Richmond, who became Duke of Richmond and G. George, the sixth Earl of G. and first Marquis of Huntly, left a second son, George, who became Viscount of Melgund and Lord Aboyne (1627). On his death the title of Viscount of Aboyne passed to his elder brother, George, and subsequently to his son, Lord James, a



GEORGE GORDON, FIRST MARQUIS OF HUNTLY

fervent royalist. The title then passed in 1666 to his younger brother, Lord Charles G. George, fifth Earl of Aboyne, was also ninth Marquis of Huntly. His eldest son, Charles, was tenth marquis and he in turn left a son, Charles, the eleventh marquis. The Earls of Sutherland are also a branch of this family. Adam G. of Aboyne (*d.* 1537) acquired the title of Earl of Sutherland by his marriage with Elizabeth, Countess of Sutherland. From this marriage sprang the G. Earls of Sutherland, who retained the surname G. till the eighteenth century, when they revived the original surname of Sutherland. The Earls of Aberdeen are descended from Jock of Scurdargne, illegitimate son of Sir John of G. who died in 1394. Of this branch Sir John G. of Haddo was made a baronet of Nova Scotia, and after him is named 'Haddo's Hole' of St. Giles' Church, Edinburgh, where he was imprisoned. His son, Sir George G. of Haddo, was raised to the peerage in 1682 with the titles of Earl of Aberdeen, Viscount of

Formartine, Lord Haddo, Methlic, Tarves, and Kellie.

Gordon, Adam Lindsay (1833-70), an Australian poet, *b.* in the Azores at Fayal. In 1853 he entered the service of the S. Australian mounted police. He led an adventurous and unsettled life, impatient of steady occupation. *Sea Spray and Smoke Drift*, 1867, a volume of poems, brought him into prominence. This was followed in 1870 by *Bush Ballads and Galloping Rhymes*, but in the year of its publication G. committed suicide.

Gordon, Alexander (1692?-c. 1754), Scottish antiquary, *b.* probably in Aberdeen; where he became M.A., taught languages and music, and painted portraits. Acquired knowledge abroad—Fr., Italian, art, antiquities. After 1720, toured Scotland and N. of England, examining Rom. remains; results published 1726, as *Itinerarium Septentrionale*. In London, issued Lives of Popes and Fr. kings; made translations, and additions to the *Itinerarium* 1731-32. In 1736, secretary to Soc. for Encouragement of Learning, and to Soc. of Antiquaries. Became also secretary to Egyptian Soc. Accompanied James Glen, F.S.A., as secretary to S. Carolina, 1741. Died in or near Charleston.

Gordon, Charles George (1833-85), known as 'Chinese Gordon,' the hero of Khartum, was *b.* at Woolwich, Kent. He was present at the assault on the Redan (1855) in Crimea. In 1860 he joined the expedition in China where the Taiping rebellion was rife. The Russians were pushing their frontiers on the Amur and Ussuri; the Mohammedans in Yun-nan and the Turkestan regions were insurgent. The Chinese empire was on the point of destruction, but G. put himself at the head of a Chinese army with a staff of Eng. and American officers. The career of the band was so glorious that it came to be known as the 'ever-victorious army.' G. recovered Nankin from the rebels and quelled the Taiping forces. In 1872 G. was appointed commissioner for superintending the Danube navigation, and in 1873 he was appointed governor of the Sudan, but resigned in 1880. In 1884 he was again sent to the Sudan where a revolt had broken out under Mahommed Ahmed, who proclaimed himself as the Mahdi. The British Government had ordered Egypt to abandon the Sudan, a most hazardous policy to carry out; and G. was deputed to go there and evacuate the Egyptian population. The situation was beset with difficulties and peril. G. was surrounded and besieged in Khartum. The siege had been protracted for five months when a relief

party was sent from England. In Sept. the relief forces commenced their ascent of the Nile; by Nov. the expedition reached the Second Cataract and the borders of the Sudan. The navigation of the river was fraught with difficulties and dangers. It was the end of Jan. before the party, crossing the desert from Korti, made their way to Khartum. On Jan. 28 the advance reached Khartum, but found that the place had been captured by the rebels two days before, and G. had been put to death. The way in which G. sustained his position at Khartum is one of the marvels of history. He was of different nationality and religion from the people of the garrison, but in them he inspired absolute faith and fidelity. On his staff he had only one British officer. The fortifications of the town were inadequate, the provisions were scanty, but in the face of all odds he persevered. His journal dating from Dec. 10 to Dec 14 was preserved, and is one of the most ennobling and inspiring documents of history.

Gordon, Charles W., see CONNOR, RALPH.

Gordon, Lord George (1751-93), leader of the 'Gordon' or 'No Popery' riots, was a son of the Duke of G. These riots were provoked by the cancelling of the restrictions on Rom. Catholics. In 1780 G. convoked his followers at St. George's Fields, London, in order to petition a repeal of the new enactments at the House of Commons. The Guards were called out, but the rioters held London for a fortnight, doing great damage to property. G. was committed to the Tower on a charge of treason, but was acquitted on the ground of insanity. He *d.* insane in Newgate gaol.

Gordon, John Brown (1832-1904), American Confederate general and statesman; *b.* Feb. 6, in Upson co., Georgia; graduated at the State University, 1852, and practised law. In 1861 entered the Confederate army as captain of infantry; rose to be Lieutenant-General. Was wounded eight times during the Civil War, and commanded a wing of Lee's army at Appomattox Court-House. Democratic candidate for Governor of Georgia, 1868. Member of National Democratic Convention, and presidential elector, 1868, 1872. U.S.A. senator, 1873-80. Governor of Georgia, 1887-90. Used to lecture on Civil War, and was commander-in-chief of United Confederate Veterans. Wrote *Reminiscences of the Civil War*, 1905.

Gordon, Sir John Watson, see WATSON-GORDON, SIR JOHN.

Gordon Bennet, the name given to a mountain in E. Central Africa seen by

Stanley in 1875. Its identity remains undetermined; it may be one of the Ruwenzori group. It rises 14,000 ft. in height.

Gordon-Cumming, Roualeyn George, see CUMMING, ROUALEYN GEORGE GORDON-.

Gordon Highlanders, or the 'Gay Gordons' as they are known historically, are one of the most famous regiments in the British Army. The regiment was raised in 1794 by the Marquis of Huntly, afterwards fifth and last Duke of Gordon, who at that time was a captain in the 3rd Foot Guards, now the Scots Guards. The regimental tartan was the 'Gordon,' with a distinguishing yellow stripe. The regiment was numbered 92nd, but in 1881 it was linked with the 75th to form the G. H. The 75th was raised in 1787 by General Sir Robert Abercromby for service in India. General Robert Crauford of Peninsula fame was a captain in the 75th. The regiment served with distinction in India, then in the Kaffir War in S. Africa, the Indian Mutiny, Egyptian Campaign (1882) and Nile expedition. The 92nd first saw service in N. Holland at Egmont-op-Zee in 1799, then in Egypt (1801), and the Peninsula. It formed part of the Scots Brigade at Waterloo and took part in Lord Roberts' famous march from Kabul to Kandahar in 1880, and it was also in the expedition to Chitral. Piper Findlater of the G. H. won the V.C. at Tirah, 1897, by playing the pipes as the Gordons stormed an Afridi stronghold, though he was wounded in both legs. During the Boer War it formed part of General Sir George White's force defending Ladysmith. During the Great War it raised twenty-one battalions which served in France, Flanders and Italy. Mons, Le Cateau and other well-known battles are included in its long roll of battle honours. General Sir Ian S. M. Hamilton (q.v.) is the present Colonel of the regiment.

Gordon Riots, see GORDON, LORD GEORGE.

Gore, Catherine Grace Francis (1799-1861), an Eng. novelist, b. at E. Retford, being the daughter of a Mr. Moody. She married in 1823 Captain Charles A. Gore, and in the following year appeared her first novel, *Theresa Marchmont*. She resided principally on the Continent, and, until her death, her novels appeared with unflinching regularity. They described the life and customs of the fashionable society of the period, and attained a certain amount of transient popularity. She was also known as a song writer. She became blind shortly before her death.

Gore, Charles, Eng. bishop; b. 1853; son of Hon. Chas. Alex. G. Educated: Harrow; Balliol College, Oxford. In 1880 became vice-principal of Cuddesdon College, and in 1884 librarian of the Pusey Library, Oxford. Vicar of Radley, 1895; and later canon of Westminster. Chaplain to Queen Alexandra, 1900; and to King Edward in 1901. In 1902 he became Bishop of Worcester, and in 1905 Bishop of Birmingham. In 1911 he was appointed Bishop of Oxford. In 1919 he resigned, and ceased to have any see. A high-churchman, with aspirations toward union of Churches. His chief works



BISHOP GORE

are: *The Church and the Ministry*, 1889; *Roman Catholic Claims*, 1889; *Bampton Lectures*, 1891; *The Creed of the Christian*, 1895; *The Body of Christ*, 1901; *Spiritual Efficiency*, 1904; *The New Theology and the Old Religion*, 1908; *Orders and Unity*, 1910; *The Religion of the Church*, 1916; *Christian Moral Principles*, 1921; *Belief in God*, 1921; *Belief in Christ*, 1922; *The Holy Spirit and the Church*, 1924; *Christ and Society*, 1928; *Jesus of Nazareth*, 1929.

Gorée, a Fr. tn. in the colony of Senegal, W. Africa. Situated on a small island E. of Dakar, and is now the chief port of the whole colony. During the Seven Years' War and the later Napoleonic wars it was a British possession. Pop. about 1500.

Gorell, John Gorell-Barnes, first Baron (1848-1913), Eng. judge, son of Henry Barnes, a wealthy Liverpool shipowner; was educated at Peterhouse, Cambridge, and in 1876 was called to the Bar. His legal career was very distinguished, and he became in turn a bencher of the Inner

Temple, a judge of the Probate, Divorce, and Admiralty Division and finally president of the same court. He retired in 1909 and was raised to the peerage. Died at Mentone April 22.

Gorell, Ronald Gorell Barnes, third Baron, of Brampton, co. Derby; b. April 16, 1884; second son of first baron and brother of second. Educated: Winchester; Harrow, Balliol College, Oxford. Called to Bar at Inner Temple, 1909. On editorial staff of *The Times*, 1911-15. Served in Great War with the Rifle Brigade. Succeeded his brother (killed in action) Jan. 16, 1917. O.B.E., 1918; C.B.E., 1919; temporary colonel and director of staff duties, War Office, 1918-20, in which capacity he did much to promote educational training in the Army. Under-Secretary of State for Air, 1921-22. A partner in the publishing house of John Murray. Has written novels and volumes of poetry.

Gorgas, William Crawford (1854-1920), American surgeon-general; b. Oct. 3, at Mobile, Ala.; son of Gen. Josiah G. Educated: S. University, Sewanee, Tenn.; Bellevue Hospital, University of New York. Surgeon, U.S.A. army, 1880. At conclusion of Spanish-American War, made chief sanitary officer, Havana—stamped out yellow fever. Made Surgeon-General by Act of Congress, 1903. In 1904 made chief sanitary officer, Panama Canal; stamped out yellow fever and malaria. Director, Internat. Health Board, Rockefeller Institution, visited Serbia early in Great War. Died, after receiving K.C.M.G. from King George V., in Queen Alexandra Military Hospital, Millbank, London, July 3.

Gorge, see BASTION.

Görgei, Arthur (1818-1916), Hungarian commander and writer, b. at Toporez, Hungary. He fought in the Hungarian interests in the war against Austria and rose to be commander-in-chief in 1849. But his glory as a commander was eclipsed by his surrender to the Russians at Vilagos. His conduct on this occasion was judged with great harshness by Kossuth, and being accused of treason he was imprisoned at Klazensfurt. In 1867 he was pardoned. He published *Mein Leben und Werke 1848 und 1849* (1851), of which there is an Eng. translation.

Gorges, Sir Fernando (c. 1566-1647), the founder of Maine, b. in Somerset, probably in the year mentioned above. He was both sailor and soldier at an early date. Before he was twenty-one he was a prisoner of the Spaniards, and in the year 1589 he fought for Henry IV. of France.

He became governor of Plymouth, and was an especial friend of Essex, whom he supported in his attempt to rebel. He was continued in his office as governor of Plymouth by James I., but he and his garrison were so badly neglected by the king that he finally resigned. He then turned his attention to the colonies and interested himself in many plantations. In 1639 he received a royal charter for Maine.

Gorgias of Leontini, famous Sicilian rhetorician and sophist, b. about 480 B.C. In 427 B.C. he was sent to Athens to petition aid against Syracuse. The remainder of his life was spent in Athens as a teacher of rhetoric, and at Larissa. His style was highly ornate, rich, and elaborate, and considerably influenced the oratory of Demosthenes, though its effects on rhetoricians of inferior calibre was vicious. Plato's treatise on rhetoric is called the *Gorgias*, and in it G. is made to express his views on the art of oratory.

Gorgons, or Gorgones, monsters of classical mythology. Hesiod mentions three—Stheno, Euryale, and Medusa. They were represented as having snakes for hair and brazen-claws. Medusa, the most famous G., was once a mortal maid, but was changed into a G. by Athene in punishment for her relations with Poseidon, and whosoever gazed at her became a stone. Perseus slew her by means of a mirror and a sword. With the monster's head the hero turned Polydectes to stone. Athene afterwards received the head and bore it in her terrible *egis* or breast-plate. Medusa in later art was represented as being of beautiful countenance.

Gorgonzola, a tn. in Italy, about 12 m. N.E. of Milan. Celebrated for its famous cheese-making. Pop. 4900.

Gori, a tn. in the Georgian S.S.R., N.W. of Tiflis. It has lumber mills. Pop. 10,000.

Gorilla, a large man-like ape, which is a native of W. Africa. It can be distinguished from the chimpanzee by the small ears, elongated head, the presence of a deep groove alongside the nostrils, the small size of the thumb, and the great length of the arm, which reaches half-way down the shin-bone in the erect posture. It also differs from the chimpanzee in its greater size; the height of a male G. being from 5½ to 6 ft. In colour it is blackish, but the hair on the head and shoulders often has a reddish tinge. It is chiefly a vegetable feeder, but, like most apes, it also preys upon small mammals, birds, and their eggs. The G. spends most of its time on the ground, although it is a skillful climber, and is not so very ferocious,

for when attacked it generally avoids an encounter, but when driven into a corner is a dangerous enemy on account of its enormous strength. Gs. have not yet been tamed, and fully adult ones have never been seen alive in captivity. Various attempts have been made to add one to the Zoological Gardens, but the animals have all died young.

Gorinchem, or Gorkum, a Dutch tn. in the S. of Holland, about 25 m. S.E. of Rotterdam. Its fine fortified gateways are typical examples of Dutch architecture. Its salmon fisheries are important, and the chief exports are grain, hemp, and cattle. Pop. 13,500.

Goring, George Goring, Lord (1608-57), an Eng. soldier, son of the Earl of Norwich. He was known for his dissolute manners during his early life. He was appointed governor of Portsmouth, and was concerned in the Army Plot, which he betrayed to parliament. Nevertheless, he declared for the king and held Portsmouth for him for a time. He took part in the battle of Marston Moor, and was defeated after Naseby at Langport, after which he retired to France. Finally he d. at Madrid.

Gorizia, among other strong positions, was demanded from Austria by Italy in April 1915 as the price of her continued neutrality in the Great War, and as 'compensation' for the advantages already gained by Austria (a party to the Triple Alliance) in the attack on Serbia (see also under AUSTRIA-HUNGARY). The Italians under Cadorna (q.v.) made a general attack on the Trentino front in the summer of 1916, and on Aug. 4 delivered a furious assault along an eight-mile line opposite G. The Austrian trenches were smashed by a continuous bombardment lasting many hours, and the Italians followed this by an impetuous infantry charge, which carried the heights on the W. bank of the Isonzo overlooking G. and also the heights farther to the N. S. of G. they stormed Monte San Michele, the key to the G. position which they had been striving to capture for the previous fourteen months. After two days' fighting, General Boroevic, the Croat-Austrian commander, lost all the Isonzo heights, and on Aug. 9, 1916, Italian soldiers escorted King Victor Emmanuel into G. But on Oct. 28, 1917, as a result of the resounding Italian defeat at Caporetto (q.v.), the Austrians reoccupied G.

Gorkum, see GORINCHEM.

Gorky, Maxim, or Aleksei Maximovich Pyeshkov (b. 1868), Russian author, b. at Nijni-Novgorod. His father dying, he lived with his mater-

nal grandmother, and was apprenticed to a shoemaker at nine. In his youth he showed a roving and unsettled disposition, rarely remaining many weeks in any of the innumerable occupations in which he was engaged. His first sketch, *Makar Chudra*, appeared in 1892. *Chelkash*, published in 1893, established his position as a writer. This was followed in 1900 by *Toma Gordyeev*, a romance. He then wrote a number of tales descriptive of a tramp's life, with which the vicissitudes of his early career had made him familiar. When he attempts to describe character and manners in the upper classes his success is not so marked. His best characters are men in conflict with society who by sheer force of personality rise above its moribund influences, and, in such characters, we have obvious reflections of G.'s own struggle. In 1906 his mission to U.S.A. in the cause of Russian freedom failed when it was discovered that the lady accompanying him was not his wife. He returned to Europe and settled at Capri. Returned to Russia before the Great War and founded a review. He is now a supporter of Soviet republicanism. His *Reminiscences of My Youth* appeared in Eng. in 1924; *Bystander*, 1930. *Konovlov* is perhaps his most representative work. G.'s drama, *The Lower Depths*, is a work of great power. Prince Kropotkin's *Ideas and Realities in Russian Literature* estimates G.'s position.

Görlitz, a Prussian tn. in prov. of Silesia. It has a fine Gothic church which dates from the fifteenth century, and also a fourteenth-century town hall. It manufs. woollen goods, machinery, and glass. The town stands in the middle of huge forest lands. It was the home of the philosopher Boehme. Pop. 85,636.

Görres, Jakob Joseph von (1776-1848), a German writer, educated under the influence of the Roman Catholic Church; he became in his early youth a strong supporter of the doctrines of the French Revolution. He advocated the establishment of a republic in Germany, and went to Paris in 1799 at the head of a deputation to advocate this. During the years 1800 to 1814 he was a teacher in Coblenz, and after this date he became known as a writer with very Liberal tendencies. He now advocated the establishment of an empire in Germany, but with Austria not Prussia at the head of it. He established a paper called *Der Merkur*, which was suppressed in 1816. He narrowly escaped arrest at the hands of Prussia, and after this became a violent political pamphleteer. In

1827 he became professor of history at the University of Munich. Amongst his chief works are: *Deutschland und die Revolution*; *Christliche Mystik*; and *Athanasius*.

Gorst, Sir John Eldon (1835-1916), an English statesman, *b.* at Preston, second son of E. C. Lowndes formerly Gorst, and educated at St. John's College, Cambridge. He began to read for the Bar, but before being called he sailed for New Zealand, where he was of great value in establishing peace between the authorities and the Maoris. He returned to England and was called to the Bar, 1865; and in the following year he entered parliament as the member for the borough of Cambridge. He failed to obtain re-election, and was for a time in charge of the party organisation. He sat for Chatham, 1875-92, and for Cambridge University, 1892-1906. He formed one of the Fourth Party (*see* BALFOUR; CHURCHILL, R.). He was knighted 1885; Solicitor-General 1885-6; Under-Secretary for India 1886; Hon. Secretary to the Treasury 1891. He took a great interest in education, and was vice-president of the Committee of Council on Education until 1902. His attitude had always been independent, and he broke with his party on the question of Tariff Reform and lost his seat. In 1910 he contested Preston in the Liberal interest, but failed to secure election.

Gorton, a suburb of Manchester, England. Has important cotton mills and iron works.

Gorton, Samuel (d. 1677), an English sectary, founder of the American sect of Gortonites, *b.* about 1600, at Gorton, Lancashire. In 1636 he sailed to Boston, Massachusetts, where he was continually involved in religious disputes. He published in England (1646) an account of his grievances against the Massachusetts government in a tract entitled *Simplicities Defence against Seven-Headed Policy*. *See* L. E. Jones, *Samuel Gorton: a Forgotten Founder of our Liberties*, 1896.

Gortschakov, *see* GORCHAKOV.

Gortz, Georg Heinrich von (1668-1719), a statesman. He entered the diplomatic service of Holstein Gottorp, but aimed at establishing the supremacy of Sweden. He became minister and chief adviser to Charles XII. of Sweden although he was not a Swede, but only the Holstein minister to Sweden. Many of his attempts to restore the power of Sweden were not only utter failures but also infuriated the Swedish populace. On the death of Charles XII. he was seized and tried by an illegal court

and executed. His execution was illegal even though it may have been deserved.

Gorz, the cap. of the prov. of that name in Austria. It is situated about 30 m. N.W. of Trieste. It manufs. principally silk and cotton goods. Since the fourteenth century it has been a cathedral town, and is now the seat of an archbishop. Pop. 30,939.

Goschen, George Joachim, Viscount (1831-1907), a British statesman, son of a London merchant of German origin, *b.* in London. He graduated from Oriel College, Oxford, with first-class honours in classics. In 1856 he became director of the Bank of England; entered parliament as Liberal member for the City of London, 1863; was appointed paymaster-general, 1865. In 1868 G. sat in Gladstone's cabinet as President of the Poor Law Board, and became First Lord of the Admiralty in 1871. In 1878 he was elected representative for Great Britain at the international monetary conferences held in Paris. In 1880 he became member for Ripon, and as ambassador to the Porte he persuaded Turkey to fulfil the obligations to Greece to which she was bound by the Treaty of Berlin. He acted as ecclesiastical commissioner, 1882; he refused the offer of Speakership in the House, 1884. Gladstone, during his administration, found in G. an uncompromising opponent to his Home Rule policy. In 1886 G. lost his seat for E. Edinburgh, but in 1887, under Lord Salisbury's administration, sat as a Liberal-Unionist and accepted the Chancellorship of the Exchequer. In 1887 he stood for Liverpool and was defeated, but in the same year he became member for St. George's, Hanover Square. In 1888 G. carried out a conversion of part of the national debt. In 1895 he became First Lord of the Admiralty, and during his period of office carried many improvements into effect. In 1900 he was raised to the peerage as Viscount G. of Hawkhurst, Kent. He was a firm and decided opponent of Chamberlain's Tariff Reform policy. G. published many works. His first important publication was *The Theory of Foreign Exchanges*, 1863. Among his other works are: *Cultivation of the Imagination*, 1877; *Intellectual Interest*, 1888; and *The Life and Times of George Joachim Goschen, Publisher and Printer of Leipzig*, 1903. G. took a keen interest in the universities. In 1874 he was elected lord rector of the University of Aberdeen, and was re-elected in 1888. In 1890 he was elected lord rector of the University of Edinburgh. He was one of the chief promoters of

the University Extension Movement. To the sphere of politics he brought the shrewd business instincts of his family and early training, and never allowed party considerations and prejudices to obscure his persuasions and convictions.

Goshawk, or *Astur palumbarius*, a bird still found in many countries of Europe, but practically extinct in the British Isles. It was formerly found here in fairly large numbers, and was used in the sport of falconry. Its extinction practically coincides with the



GOSHAWK

disappearance of our large forests. The male bird is much smaller than the female. In colour the bird is brown on the upper part of the body and white underneath. The tail has dark bands across it.

Goshen: (1) A part of ancient Egypt given by Pharaoh to the relations of Joseph. The chief town was Kesem, or Gesem (in the Septuagint), or in the classics, Phacusa, modern Fakoos. (2) The cap. of Elkhart co. in Indiana, U.S.A., on the R. Elkhart, a tributary of the Michigan. It is an important commercial centre, its chief manufactures being flour, condensed milk, knitted goods and products of metal, wood and rubber. It is served by the Big Four and New York Central railways and has a landing field for air-mails. G. was settled in 1828 and chartered as a city in 1868. Pop. 10,397.

Goshen, or Goschen, Land of, a part of Bechuanaland in British S. Africa. Some renegade Boers founded a re-

public there in 1882. In 1884 it was placed under British protection.

Goslar, an ancient imperial city on the R. Gose, district of Hildesheim, in the prov. of Hanover, Germany. It was founded by the Emperor Henry I. in 922. G. has many ancient and interesting buildings, including the Kaiserworth, which contains the statues of eight emperors. Towards the S. is the Rammelsberg, which has many valuable ores (gold, silver, copper, zinc, etc.); the mines having been worked since the tenth century. Pop. about 20,000.

Gosling, Harry (1861-1930), English labour leader, and Minister for Transport in the Labour Government of 1924. He was president of the Transport Workers' Federation and chairman of the Strike Committee in the strike of 1911, and a leader in the dock strike of 1912. Became a member of the Industrial Council which was set up after 1911. Elected member for Whitechapel in 1923, he was Paymaster-General in the Labour Gov. of 1924. Made Companion of Honour in 1917. Wrote his autobiography in 1927.

Gosnold, Bartholomew (d. 1607), an English navigator, who sailed from Falmouth, 1602, in the *Concord*, and discovered Cape Cod and some neighbouring islands. He was the leader of an expedition which discovered the Virginian Capes, and founded Jamestown in 1606, where he died.

Gospel, The, the 'Good Story,' or the revelation of God to man of His purpose and will for the salvation of all mankind. It is not *qua* Gospel, the Gospel as set forth by the four evangelists, but the story of God's will concerning man, as manifested in the life and death of Jesus Christ.

Gospellers, in church history, a name applied to two classes of people: (1) The various precursors of the Reformation, such as Wyclif and the Lollards, who laid much stress upon preaching the Gospel, and upon the dissemination of the knowledge of the Gospels among the people; (2) an Antinomian sect which arose about the time of the Reformation. The term is also used in the Church of England for the priest who reads the Gospel, usually either from the N. side of the altar or from the middle of the choir.

Gospels, The Four, see MATTHEW, MARK, LUKE, and JOHN.

Gospels, Harmony of the, see NEW TESTAMENT.

Gosport ('God's port'), a market tn. and important naval dépôt, to the W. of Portsmouth Harbour, Hants, in England. It is connected with Portsmouth by a floating bridge. The Haslar Hospital, the Clarence

victualling yard, and the barracks are among its notable features. Yacht-building is an important industry of G., and ships' anchors, cables, powder magazines, chains, and sails are also manufactured there. Pop. (including Alverstokey) (1921) 33,580.

Gossamer, a fine filmy substance, something like cobwebs seen floating in the air in autumn. It is the web spun by certain small spiders; the threads are invisible when spun, but a number are woven together by the wind. See SPIDER.

Gossan, a term common amongst the miners of Cornwall for the outcrop of a lode. The Gs. are often composed of rich veins of metal, and are very easily worked. The ease with which they are worked is largely due to the fact that being on the surface they have been thoroughly oxidised.

Gossau: (1) A vil. in the canton of St. Gall, Switzerland. Lace and embroideries are made there. Pop. 8000. (2) A vil. in the canton of Zürich. Cotton and silk industries. Pop. 4000.

Gosse, Sir Edmund William (1849-1928), English poet, critic, and essayist, b. in London, the son of Philip Henry G., the naturalist. In 1867 he was appointed assistant librarian to the British Museum, and held that appointment till 1875. He then became translator to the Board of Trade. In 1884 he became Clark lecturer on English Literature at Trinity College, Cambridge, and in 1904 he was made librarian to the House of Lords. His style is characterised by its lucidity and sweetness. His chief works are: *On Viol and Flute*, 1873; *Studies in the Literatures of Northern Europe*, 1879; *New Poems*, 1879; *From Shakespeare to Pope*, 1885; *Raleigh*, 1886; *Life of Congreve*, 1888; *History of Eighteenth Century Literature*, 1889; *Robert Browning*, 1890; *History of Modern English Literature*, 1897; *Life and Letters of Dr. John Donne*, *Dean of St. Paul's*, 1899; *Life of Jeremy Taylor*, 1904; *French Profiles*, 1905; *Coventry Patmore*, 1905; *Life of Sir Thomas Browne*, 1905; *Father and Son* (a study of his early family life), 1907; *Henrik Ibsen*, 1908; *Two Visits to Denmark*, 1911; *Portraits and Studies*, 1912; *Life of Swinburne*, 1917. His chief service to letters is perhaps his introduction of modern European writers into English. For his services to Scandinavian literature he was created in 1901 a knight of the Norwegian order of St. Olaf.

Gosse, Philip Henry (1810-88), an English naturalist. After farming in Canada, he returned to England and

published *The Canadian Naturalist*, 1840. In 1847 after visiting Jamaica for the British Museum, he published *Birds of Jamaica*. Among his other works are: *Actinologia Britannica*, 1858-60; and *The Romance of Natural History*, 1860. See *Life* by his son, Edmund G., 1890.

Gosselies, a tn. in Belgium in Hainaut, in the administrative dist. of Charleroi. It has coal mines, and manufs. cutlery, soap, and linen. Pop. 10,000.

Gosson, Stephen (1555-1624), an English author and divine; graduated from Oxford, 1576. He wrote the tragedy *Catiline's Conspiracies*, and the comedy *Captain Mario* (neither now extant), but later wrote severely against the stage. G. was rector of Great Wigborough, 1591, exchanging this living for that of St. Botolph, Bishopsgate, London, 1600. His famous *The Schoole of Abuse*, 1579, led ultimately to Sidney's *Apologie for Poetry*, 1595. He also wrote *The Ephemerides of Phialo*, and *Plays Confuted*. See Arber's edition of *The Schoole* . . . 1868; Lodge, *Defence of Plays*, 1580 (edition of 1853, p. 7); Collier, *Dramatic Poetry*, ii.; and *Bibliographical Catalogue*.

Got, François Jules Edmond (1822-1901), an actor, b. at Lignerolles (Orne). He made his appearance at the Comédie Française in 1844, and speedily rose to the first rank as a comic actor. His most finished performances were as Giboyer in Augier's *Effrontés*, and *Fils de Giboyer*, and as Bernard in *Les Fourchambault*. To the part of Giboyer he devoted himself for two years. In 1881, he was accorded the Cross of the Legion of Honour. G. was also the author of *L'Esclave*, and of the libretto of *François Villon*, produced at the Opera in 1857. He d. at Passy.

Göta: (1) A canal in S. Sweden connecting the navigation of the Göta-elf with the Gulf of Bothnia by Lake Wener (Venern), Vykeén, Wetter (Vettern), Boren, and Boxen, and the Baltic with the Kattegat (Cattegat). It terminates at Mem., 3 m. from Söderköping. Length about 50 m., depth 10 ft., breadth 79 ft. Including lakes, some 235 m. are navigable, and there are 57 locks. It was projected by Gustavus Vasa, but not carried out till 1810-32, under Count Platen and Telford. (2) A river flowing from Lake Wener to the Kattegat. It branches into two at Kongelf, the S. branch passing Göteborg (Gothenburg). It is 68 m. long, and navigable. To avoid the falls of Trollbätta near its source, the Trollbätta Canal was constructed.

Gotha, a tn. of Germany in the republic of Thuringia, cap. of Gotha

state, 14 m. W. of Erfurt. One of the most important mercantile towns of Thuringia, it is among the foot-hills N. of the forest. There are narrow streets in the old part, but much has been destroyed by fires at different times. S. is a park fronted by the ducal castle of Friedenstein (1643) containing the state archives, ducal library, and a fine coin-collection. Other noted buildings are the church of St. Mary (12th century), Augustinian Church (13th century), new museum, town hall (a Renaissance building of the 16th century), the castle of Friedrichsthal, and the

world. A section of it is devoted to the genealogy of royal families, distinguished members of the nobility, etc., and statements as to population, trade, and similar matters of all civilised states are contained in the other sections. It has gained authority all over the world from the care and exclusiveness with which it is edited. It takes its name from the place of publication.

Gotha, Duchy of, see SAXE-COBURG-GOTHA.

Gotham, Tales of the Mad Men of, a collection of jests, representing the absurd doings and sayings of the



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GOTHENBURG

The buildings are the Museum, the Christina Church and the Town Hall

observatory (1872). There is also the famous geographical establishment of Justus Perthes. Manufactures include porcelain, tobacco, smoked meats, sausages, sugar, toys, machinery, pianos, fire-engines, rubber-hose, woollens. The *Almanach de Gotha* has been published here since about 1763, and Petermann's *Mitteilungen* since about 1854. The town is mentioned as early as 770 as 'Gotaha.' It was surrounded by walls, 930, by Gothard, Abbot of Hersfeld. Pop. 45,369.

Gotha, *Almanach de*, a universal political register, published in German since 1764 and in French since 1871. It is a diplomatic, governmental and statistical record of the

people of Gotham—a Nottingham parish near Trent junction. The simplicity of the inhabitants has become proverbial, but was said to have been assumed originally to avert a king's anger. One absurdity attributed to them is the building of a wall round the cuckoo to secure eternal spring. These tales are similar to the *asteia*, or *facetiae*, ascribed to the fifth century Alexandrian philosopher, Hierocles. The tales were first printed about 1550 under the title, *Merrie Tales of the Mad Men of Gotham*, collected by A. B. (Dr. Andrew Boorde?). The people of Abdera in Thrace had a similar reputation for folly, and such stories exist, *mutatis mutandis*, among almost

all races of mankind. See Halliwell's reprint of the *Merrie Tales*, 1840, and *Nursery Rhymes*; Hazlitt, *Shakespeare Jest-books*, 1864; Ashton, *Chap-books of the Eighteenth Century*, 1882; Cunningham, *Amusing Prose Chap-books*, 1889. For simpleton stories generally, see Clouston, *Book of Noodles*, 1888 (new ed., 1903); Busch, *Deutscher Volkshumor*, 1877.

Gothard, St., see ST. GOTHARD.

Gothenburg (Swedish *Göteborg*), situated on the R. Göta, and next to Stockholm, the capital, the most important city of Sweden. The town is quite modern, having been rebuilt to a large extent in consequence of numerous fires, but it was originally founded in 1618 or thereabouts, by Gustavus Adolphus. It has an excellent harbour, seldom obstructed by ice, which affords a shelter for a large number of vessels from all parts of the world. Its commercial importance dates from the continental blockade of 1806, when it became the chief British depôt of northern Europe. It is the principal port in Sweden and the centre of the shipping industry. The harbour has been enlarged recently and the navigation school was rebuilt in 1916 while a marine museum was opened in 1913. Among its manufacturing industries are ship-building, cotton-spinning, iron and steel milling, and it produces sugar, paper, leather, sailcloth, etc. It receives about one-fourth of the total foreign commerce of Sweden. Its streets are lighted by gas and electricity, and the water supply is good. The lower portion of the town, along the river, has broad streets, partly formed by canals. The exchange, cathedral, town hall, and museum deserve special mention among the buildings of G., and it has a fine garden belonging to the Horticultural Society. Pop. about 233,000.

Gothic Architecture, see ARCHITECTURE—*Gothic*.

Gothic Language, the oldest and most primitive of the Teutonic dialects of which remains still exist; it belongs to the low German division. Gothic was spoken by the Eastern and Western Goths who originally lived near the Vistula, but who migrated into Asia, Galatia, and Cappadocia, and finally overran the countries of Southern Europe. It was while the Goths occupied Italy that Bishop Ulphilas (318-88) translated the Bible into Gothic, and the remnants of this translation form the oldest existing record of the language. This precious relic is preserved at Upsala. Fragments of Gothic writings are to be seen at Wolfenbüttel (in the *Codex Carolinus*) and at Milan,

where are portions of the calendar in which occurs the original form of the name of the Gothic people. The language gradually died out as the Goths became absorbed in the Italian, French, and Spanish peoples, and adopted the Latin language. Gothic played an important part in the building up of Grimm's Law (*q.v.*), since in it is preserved, without essential alteration, the Primitive Teutonic system of consonants. See Skeat, *Maxo-Gothic Glossary*; Gabelentz und Loebe, *Gothic Texts*; and Zacher, *Das Gotische Alphabet Ulfilas und das Runen-Alphabet*.

Gotland, Gottland, Gotland, or **Gautland**, the largest of the Swedish islands in the Baltic, forming a prov. (län) of Sweden, off E. coast. It is about 40 m. E. of Sweden, about 1215 sq. m. in area, 83 m. long. The surface is 200-300 ft. above sea level. The coast is steep, but the interior mostly level. Visby (Wisby) on W. coast is the chief town, connected by rail with Hemse in the interior. The chief occupations of the people are agriculture, cattle-raising, shipping, fishing, and lime-burning. Timber, marble, sandstone, and lime are exported to Stockholm. There are some fine architectural remains. By the eighth century G. was tributary to Sweden, Visby being one of the most important trading towns of N. Europe till late in the fourteenth century. In 1030 St. Olaf probably introduced Christianity there. It belonged to the German Hanseatic League in the Middle Ages, being subject alternately to Denmark and Sweden from 1361. In 1645 it was finally ceded to Sweden. Pop. about 54,000.

Goths, the name of a powerful Teutonic people who played an important part in the barbarian invasions and made themselves masters of Italy for upwards of a century. From a fragment of a Gothic calendar (see *GOTHIC LANGUAGE*), it would seem that they originally called themselves *Gut-thiuda* ('the people of the Goths' *thiuda*, people). Their first home is supposed to have been the southern shores and the islands of the Baltic. Legend makes them to have come there from Scandinavia, but this does not appear to be supported by facts. The earliest mention of the G. belongs to the time of Alexander the Great, and is that of the Greek traveller Pytheas of Marsilles. His evidence still exists in quotations from him to be found in the writings of Pliny and others. According to Pytheas, a tribe of *Guttones* lived and gathered amber on the Prussian shores of the Baltic. Next, Tacitus mentions the *Gothones*, evidently the *Guttones*, but they are neighbours of the Lygii, and no

longer on the coast. Their certain history begins in the earlier years of the third century, in the reign of Alexander Severus. They had then founded an empire on the northern shore of the Black Sea, and about the delta of the Danube. They greatly increased their numbers by conquering other Teutonic tribes, and came into conflict with the Romans, into whose province of Dacia they made successful inroads. Gibbon says (*Rome*, x.) 'The Emperor Decius (A.D. 249) . . . was summoned to the banks of the Danube by the invasion of the Goths. This is the first considerable occasion on which history mentions that great people.' They devastated Mesia and Thrace, vanquished and killed Decius, and withdrew on receiving great sums of money and a promise of yearly tribute. In 258-59 they crossed the Black Sea, the Bosphorus, and the Hellespont, embarked on the Mediterranean, pillaged the shores of Asia Minor, burnt the temple of Ephesus, and sacked Athens. In 269 they equipped an immense fleet, ravaged Crete and Rhodes, and, returning through Thessalonica were completely crushed by the Emperor Claudius. They recovered, however, and the Emperor Aurelian secured a term of comparative peace only by ceding to them Dacia and the left bank of the Danube. During this period the G. mingled with the Romans, and were influenced by the Roman civilisation; they became converted to Christianity. It was at this epoch that Ulfilas translated the Bible into the Gothic language (*q.v.*). Now, too, the G. divided themselves into two great groups, the Visigoths (or Western G.) inhabiting the slopes of the Carpathians in Dacia, and the Ostrogoths (or Eastern G.), who dwelt on the shores of the Black Sea. This separation became complete when, after conflicts with Constantine (321) who imposed peace upon them, and with Valens, whom they subdued, the terrible Huns made a successful irruption among them, and completely crushed their empire. The Ostrogoths submitted to the Huns, the Visigoths crossed the Danube, and settled finally within the Roman empire (376). Their history deviates at this point.

The Visigoths made peace with Valens and were allotted cantonments. Many accepted service in the Roman army, others, who came to be known as the *Mæsogoths*, devoted themselves to agriculture under Roman protection. In 387, provoked by the vexatious conduct of the Roman functionaries, they revolted and forced the Emperor Theodosius

to conclude a new treaty with them, by which some received land and others provisions in exchange for military contingents. After the death of Theodosius, their king, Alaric, claimed a province for his people. The refusal of this demand led to an insurrection which marks an epoch in the history of Europe. The Visigoths under Alaric devastated Macedonia, Greece, and Illyria; then, passing into Italy, they took and pillaged Rome (410). Alaric died the same year. Withdrawing from Italy, the Visigoths under Alaric's successors overran southern Gaul and Spain. Under Wallia (415-19) they obtained from the Romans *Aquitania secunda*, and fixed their capital at Toulouse. The Gothic kingdom was actually now a vassal kingdom of the Roman empire; the G. greatly helped the Romans in their conflicts with the Vandals, the Huns, and the Alani, and in their turn reaped benefit from the Roman civilisation. Theodoric I. played an important part in the reduction of the Huns under Attila at Châlons. Theodoric II. and Euric conquered Spain and extended their kingdom as far as the Loire. They established a constitution and adopted some of the arts of civilised life. But they were forced to recoil by the Franks under Clovis (507), and their kingdom was completely broken up by the Saracens (711). Dispersed and decimated, the greater number of the Visigoths settled, keeping up their institutions, in the region of the Pyrenees. Their laws were translated into Castilian under Ferdinand III. (thirteenth century to serve as their code of justice. They gradually became absorbed in the Latin peoples of Spain and Languedoc (*see* CATALONIA).

The Ostrogoths took part with the Huns under Attila in the expedition against Gaul and so encountered their kinsmen, the Visigoths, in battle, sharing in the terrible defeat at Châlons (451). Under their greatest sovereign, Theodoric, they warred against the Eastern Emperor Zeno, and acquired some of his richest provinces. Theodoric also defeated Odoacer (*q.v.*), King of Italy (488), and reigned gloriously and wisely in Italy until his death (526), dealing even-handed justice to the conquered and to those of his own race. On the death of Theodoric the Emperor Justinian organised a campaign against the Ostrogoths with the object of wresting Italy from them and restoring it to the emperors of Constantinople. After a protracted struggle, Justinian's general, Narses, succeeded in crushing them, and with their defeat (553) Theodoric's kingdom came to an end. The Ostrogoths

dispersed; many of them were absorbed in the Roman empire, some returned to the Danube, where they commingled with other Teutonic peoples. A small number of the Ostrogoths have an interesting history apart from that of the rest. These had remained N. of the Black Sea when the great body of the people migrated with the Huns. They survived all the other Gothic peoples and were found in the Crimea by the Flemish traveller, Burbeck, in the sixteenth century, still speaking their own language. They were in succession vassals of the Roman empire of the East and of the Mongols; finally they became absorbed in the Tartar race. See Gibbon, *Decline and Fall*; and Hodgkin, *Italy and Her Invaders*, 1692.

Goto, or **Gotto**, a group of islands, five in number, belonging to the Japanese archipelago, and forming the westernmost group in the channel of Korea, W. of the island of Kiushiu. The largest of the group is about 25 m. long.

Götterdämmerung, see RAGNARÖK.

Gottfried von Strassburg (Strasbourg), a Middle High German epic poet, the most brilliant of the thirteenth century (fl. c. 1200), contemporary with Hartmann von Aue, Wolfranc von Eschenbach, and Walter von der Vogelweide. In 1210 he began his great epic, *Tristan und Isolde*, after French originals (especially that of the *trouvère* Thomas of Brittany). He died between 1210-20, leaving his work unfinished. It was completed by Ulrich von Türheim (1233-66), and Heinrich von Freiberg (c. 1300). This poem furnished the subject for Wagner's great opera. See *Works*, Bechstein's edition, 1881; von der Hagen's edition, 1823; editions and translations of *Tristan* by Massmann (1843), Kurz (1844), Simrock (1835), and Hertz (1877); also works of Franck (1865) and Golther (1887).

Gothelf, Jeremias, see BRIZIUS, ALBRECHT.

Göttingen, a tn. of Hanover prov., Prussia, cap. of G. principality, on the Leine Canal, at the foot of Mt. Hainberg, 37 m. N.E. of Cassel. The famous university founded here by George II. of England (c. 1737) was rechartered in 1836 as 'Academia Georgia Augusta.' The town was taken by Tilly in 1626. The Royal Academy of Sciences was founded in 1751 by Haller. In connection with the university are the academical museum, botanical garden, library, observatory, institutes of anatomy and chemistry, etc. Manufactures linen and woollen stuffs (famous in the fourteenth and fifteenth centuries), leather goods, musical and surgical

instruments, scientific apparatus, soap, starch, sausages and beer. The book trade is important. The G. school of poets and writers included Voss (d. 1826), C. Stolberg (d. 1819), F. L. Stolberg (d. 1821), Hölz (d. 1776), and Leisewitz (d. 1806). See Freusdorff, *Göttingen in Vergangenheit und Gegenwart*, 1887. Pop. about 41,000.

Gottschalk, **Gotescaulus**, or **Fulgentius** (c. 805-68), a German monk, prominent in a theological controversy of the ninth century. Son of Berneo, a Saxon count, he early entered the monastery of Fulda. Prevented from securing release from his vows by his abbot, Rabanus Maurus, he was transferred to the Benedictine convent of Orbais (Soissons). G. studied St. Augustine's writings, and adopted the doctrine of twofold predestination (to sin or salvation). He visited Italy (837-38 and 845-48), but his views roused much opposition. At the Synod of Mainz, 848, he was found guilty of heresy by Hincmar, and condemned at an assembly at Quircy, 849. He died imprisoned in the monastery of Hautvilliers, Rheims. See Migne, *Patrol. Lat.*, cxxi., *Nouvelle Biog. Générale*; Life by Borrasch (1868), by Gaudard (1888).

Gottschall, **Rudolf von** (1823-1909), a German dramatist, poet, and miscellaneous writer. Born at Breslau, he studied at Königsberg, Breslau, and Berlin. His sympathies with the revolutionary movement of 1848 produced the tragedies *Lambertine von Méricourt*, 1850; *Ferdinand von Schill*, 1851; *Die Marseillaise*; *Wiener Immortellen*, 1848; the first poems, *Gedichte*, 1850, and the lyric, *Die Göttin*, 1853. Among his plays are *Pitt and Fox* (historical comedy), 1854; *Amy Robsart*; *Mazeppa*, 1859; *Katharina Howard*, 1872; *Maximilian Robespierre*; *Hieronymus Snitger*. (See *Dramatischen Werken*, 2nd edition, 1884). His other works include the epic *Carlo Zeno*, 1853; *Merlins Wanderungen*, 1887; *Lieder der Gegenwart* (2nd edition), 1842; *Maja*, 1864; *König Pharaos*, 1872; *Neue Gedichte*, 1858; *Poetik* (6th edition), 1893; *Sebastopol*, 1856; *Janus*, 1873; *Bunte Blüten*, 1891; *Späte Lieder*, 1905; *Madonna und Magdalene*, 1843. (See *Unsere Zeit*, which he edited from 1864-88), for his poems and essays). Among his novels are *Welke Blätter*, 1877; *Im Banne des Schwarzen Adlers*, 1875; *Das Goldene Kalb*, 1880; *Die Erbschaft des Blutes*, 1881; *Die Papierprinzessin*, 1883; *Die Tochter Rübezahls*, 1889; *Auf freien Bahnen*, 1900; *Ariadne*, 1902. *Zensurflüchlinge* appeared (2nd edition) in 1843; *Reisebilder aus Italien*, 1864; *Zur Kritik des modernen Dramas*,

1900. G. edited the *Ostdeutsche Zeitung* in 1862, and took over the management of the *Blätter für literarische Unterhaltung* till 1888. The 7th edition of his valuable *Die deutsche Nationalliteratur des 19 Jahrhunderts* appeared in 1901-02. See autobiography, *Aus meiner Jugend*, 1898.

Gottsched, Johann Christoph (1700-66), a German critic and writer, educated at Königsberg University. He became president of the *Deutsch-Liebende Poetische Gesellschaft* at Leipzig, 1726, and did much to refine the German language and raise the level of its literature and drama. He was professor of poetry in 1730, of logic and metaphysics in 1734. G. tried to abolish the bombastic affectations of the second Silesian school, and substitute a nobler drama based on French models. His *Der sterbende Cato* (1732) was a poor example. He edited the weeklies *Die vernünftigen Tadelrinnen* (1725-26) and *Der Biedermann* (1727). His wife, Luise Adelgunde Viktoire (1713-62), and the theatrical manager, Neuber, and his wife, helped G. in his efforts to improve the drama. His *Critische Dichtkunst* appeared in 1730, founded on Boileau's *Art Poétique*. He became later involved in a violent literary controversy with Bodmer and Breitinger. Lessing (1729-81) destroyed his reputation as a 'literary dictator,' and Gellert (1715-69) replaced him as a popular favourite about 1750. See Ernesti, *Memoria J. C. Gottschedii*, 1767; Gervinus, *Geschichte der National-Literatur der Deutschen*, 1835-38; Reicke, *Zu Gottscheds Lehrjahren*, 1892; Kränke, *Gottsched und Flotwell*, 1894; Wolff, *Gottscheds Stellung im deutschen Bildungsleben*, 1895-97; Danzel, *Gottsched und seine Zeit*, 1848; Wanick, *Gottscheds und die deutsche Literatur seiner Zeit*, 1897; Breitmaier, *Die poetische Theorie Gottscheds und der Schweizer*, 1879; Reichel, *Ein Gottsched-Denkmal* 1900. Gottsched: *Biographische Skizze*, *Kleines Gottsched-wörterbuch*, 1902. Reichel founded the *Gottsched-Gesellschaft* in Berlin.

Götz von Berlichingen, see BERLICHINGEN, GÖTZ VON.

Gouda, or Ter-Gouw, a tn. of Holland in the prov. of S. Holland. It is situated on the northern side of the Gouwe, where it joins the Yssel, 10 m. N.E. by E. of Rotterdam. Founded in 1485, it was destroyed by fire, and rebuilt in 1552. Formerly the principal industry was cloth weaving, and later the making of clay pipes, it now has factories for stearine candles, cigars, and yarn, and the G. cheeses are celebrated. Its shipping trade is large and it is one of the chief markets of S. Holland. It has a regular

steamboat service along the canals. Pop. 27,900

Goudimel, Claude (1505-72), a musical composer of the sixteenth century. He was b. probably at Besançon, but both the Fr. and Belgians claim him as their countryman. Very little is known as to his early education, but in addition to his musical knowledge he must have acquired a sound classical training, as proved by some of his letters, which are written in excellent Latin. In 1540 he founded a school of music at Rome, but later returned to Paris, where he published, in 1555, a musical setting of Horace's *Odes*. He also published in 1565 a collection of vocal pieces as a setting to the celebrated Fr. version of the Psalms by Marot and Beza; and some of his songs appeared in a collection at Lyons, entitled *La Fleur des Chansons*, 1574. In 1572 G. became a convert to the reformed religion, and met his death in the massacre of the Huguenots. See Michel Brenet's 'Biographie,' *Annales franc-comtoises*, Besançon, 1898, P. Jacquin).

Gough, Sir Hubert de la Poer, British general; b. Aug. 12, 1870; eldest son of General Sir Chas. John Stanley G. Educated at Eton and Sandhurst. Joined 16th Lancers, 1889. Tirah Expedition, 1897-98. Severely wounded in S. African War, 1899-1902. Professor at Staff College, 1904-06. Asbrigadier-general in command of 3rd Cavalry Brigade at the Curragh in March 1914, he was the principal one of those officers that refused to be employed against any resistance from Ulster to the Home Rule Act, if passed. In France and Flanders in the Great War, with 2nd Cavalry div. and 7th div., 1915; 1st Army Corps, 1916. Commanded the ill-starred 5th Army, 1916-18—Pozières, Thiepval, Beaumont-Hamel; operations on Ancre, Langemark, and St. Quentin—promoted to lieutenant-general. He was unsuccessful in defence at the Somme, March 1918, and was superseded. Chief of the Allied Mission to the Baltic, 1919. Retired with rank of general.

Gough, Hugh Viscount (1779-1869), a British field-marshal, b. at Limerick. He was a descendant of Francis G., Bishop of Limerick in 1626. In 1794 he obtained a commission in the army, and saw active service in S. Africa and in the W. Indies. In 1809 he was called to take part in the Peninsular War, and joined the army under Wellington. He was severely wounded at Talavera and had his horse shot under him. He was afterwards promoted lieutenant-colonel. He also fought at the battle of Barrosa, and again at

Vittoria and Nivelles, where he was once more severely wounded. He returned home at the close of the war and enjoyed a respite of some years from active service. In 1830 he was promoted major-general. In the first Chinese War he was appointed commander-in-chief of the British forces and achieved many victories in the face of great difficulties. In 1862 he was made a field-marshal. See R. S. Rait, *Lord Gough*.

Gough, Richard (1735-1809), an English antiquary, *b.* in London, died at Enfield. His father was a director of the East India Company, and a wealthy man. G. showed signs of an unusual intelligence at an early age, and at sixteen published a work called *Geography Modernised*. He went to Cambridge in 1752 and began his work there on British topography. His best-known publications are: *History of the Society of Antiquaries*, and *The Sepulchral Monuments of Great Britain*.

Goujon (or Gougeon), Jean (c. 1515-68), a Fr. sculptor of the Renaissance, known as 'the French Phidias,' and 'the Correggio of sculpture.' He is first mentioned in 1540, as working on Saint-Maclou at Rouen. In 1541 he went to Paris, joining P. Lescot in the decoration of Saint-Germain l'Auxerrois, his work there including the 'Évangélistes' and 'Déposition de la Croix' (now in the Louvre). G. decorated the Château d'Ecouen for the Huguenot Constable Anne de Montmorency, 1544-47. His chief productions there were 'La Victoire ailée,' 'La Foi,' 'Le Sacrifice d'Abraham' (Chantilly). He did woodcut illustrations (1547) to the *Vitruve de J. Martin*. G.'s first period of work upon the Louvre was between 1547-50, including the staircase of Henri II., figures of the Ciel-de-Bœuf, caryatides of the Salle des Cent-Suisses in the Louvre, and figures of the Fontaine des Innocents, 1549. His 'Diane Chasseresse,' originally in the courtyard of the Château d'Anet, is now in the Louvre. By 1560 the Louvre decorations were completed. G.'s name disappears from the list of 'Matres Maçons' under Lescot, 1560-61. The tradition that he was shot during the St. Bartholomew massacres (1572) is now no longer accredited. Audot et Pottier, *Essai sur la vie de Goujon*, prefixed to Réveil's engravings of G.'s works, 1827-44; Félibien, *Recueil historique de la Vie des plus célèbres Architectes*; Lister, *J. Goujon*, 1903.

Goulburn: (1) A city of Argyle co., N.S.W., Australia, on R. Wollondilly, 108 m. S.W. of Sydney. It is the see of an Anglican and a Rom. Catholic bishop. Public buildings

include a cathedral, hospital, gaol, and mechanics' institute. There are breweries, tanneries, boot and shoe factories, and flour mills. G. county has Murray R. on the S. Pop. 12,369. (2) A river of Victoria, Australia, rising near Emerald Hill in the Great Dividing Range (Wonnangatta co.), flowing N. and N.W. through the Jamieson and Wood's Point gold-fields, and falling into Murray R. about 10 m. above Echuca. Irrigation works have been carried on in the valley since 1893. The course above Seymour is much impeded by rapids, fallen trees, and rocks, and not easy to make navigable. Total length about 345 m.

Goulburn, Henry (1784-1856), an English statesman, *b.* in London, and educated at Trinity College, Cambridge. In 1808 became Tory M.P. for Horsham, subsequently Secretary for Home Affairs, and Under-Secretary for War and the Colonies, Chief Secretary to the Lord-Lieutenant of Ireland in 1821, and Chancellor of the Exchequer under Wellington in 1828, and under Sir Robert Peel in 1835. Left office in 1846. See S. Walpole, *History of England*, 1878-86.

Gould, Benjamin Apthorp (1824-96), an American astronomer, son of B. A. Gould, the educationist (1787-1859). Graduating from Harvard in 1844, he then studied astronomy in Europe. He founded the *Astronomical Journal*, 1849, editing it till 1861. He was director of the longitude determinations of the U.S.A. Coast Survey, 1852-67; head of the Dudley Observatory at Albany, 1856-59. In 1863 he undertook the remarkable anthropological tables of the U.S.A. Sanitary Commission. G. was organiser and director of the National Astronomical Observatory at Cordoba, Argentina, from 1868 to 1885. His *Uranometria Argentina*, 1874, did for the southern hemisphere what Argelander's *Atlas*, 1843, did for the northern. G. also wrote *Catálogo de Zonas Estelares*, 1884. He was among the first to realise the importance of photography in determining stellar positions accurately. He became president of the American Association for the Advancement of Science, 1868.

Gould, Sir Francis Carruthers (1844-1925), son of Richard Davie G., architect. Member of the Stock Exchange for some twenty years of his early life, and later assistant-editor of the *Westminster Gazette*. Early evinced great skill in caricature and was for many years a contributor of illustrations to the *Pall Mall Gazette* and *Truth*. A notable authority and lecturer on parliamentary

matters. His brilliant series of cartoons in the *Westminster Gazette*, extending over a considerable number of years, to the very end of its appearance as an evening paper, were an undeniably strong factor in the Liberal cause, and were doubtless that part of his work which primarily earned for him his knighthood in 1906. They dealt with every important phase of parliamentary controversy, epitomising the very pith of a political situation in cleverly executed sketches often adapted from scenes in Shakespeare or Dickens, or from the drawings of Tenniel in *Alice in Wonderland*. His draughtsmanship was angular and rough; but the humour was unflinching, and often startling. His publications include *Froissart's Modern Chronicles*, 1902-23; *Who Killed Cock Robin?* 1897; and *Tales told in the Zoo*, 1900.

Gould, George Jay (1864-1923), an American financier; son of Jay Gould. Privately educated, he later obtained control of large railway interests. He was president of the Little Rock and Fort Smith Railway, 1888; of the St. Louis, Iron Mountain and Southern, Missouri Pacific, and others, 1893; of the Manhattan Elevated, 1892.

Gould, Jay (1836-92), an American capitalist, educated at Hobart Academy and on his father's farm. For a time he was engaged in surveying (1852-56), and in the lumber and tanning business. By 1857 he became chief shareholder in the small bank at Stroudsburg, Pennsylvania. He began buying up railroad bonds at this time, becoming a broker in New York, 1859. After the panic of 1857 he became president and manager of the Rutland and Washington Railway, later uniting it with the Saratoga Railway. He was president of the Erie Railway Company, 1868-72, and invested largely in the stocks of other railways and telegraph companies (Union Pacific, 1873-83; Missouri Pacific, Wabash, St. Louis and San Francisco Railways and others; W. Union Telegraph Company, 1881, finally controlling them all). In 1882 he produced stock certificates to prove his commercial stability. His son (b. 1858) succeeded him as president of the Manhattan Elevated Railroad of New York, 1892. His worst action was a scheme formed with 'Jim' Fisk, for cornering the gold market, leading to the 'Black Friday' panic, 1869. He has been called the 'Napoleon of American finance.' See Ogilvie, *Life and Death of J. Gould*, 1892.

Gounod, Charles François (1818-93), a Fr. composer of sacred music

and later of opera. He showed an early passion for music, and after studying under Halévy, passed brilliantly through the Conservatoire, receiving at the age of twenty-one the Fr. Institute's *grand prix* for composition. His intention had been to study for holy orders, and he went to Rome with that object; and although nothing came of it, he continued to devote himself wholly to the composition of church music. The great success of his third mass (1849) aroused in him the ambition to explore a wider field; and, saturated with the ideals of Ger. art, music, and literature, he turned to the lyric drama, *Philémon et Baucis* being his first attempt. But it was not until 1851 that he was accorded any recog-



C. F. GOUNOD

nition as an operatic composer; in that year *Sapho* was produced, and was very generously received. In 1852 he wrote choral music for a production of Poussard's *Ulysse*, and two years later a favourable reception was given to his *La Nonne Sanglante*. His real success, however, came with the production of *Faust* (1859), a very beautiful work in which G.'s genius reaches its zenith, and perhaps the most widely popular opera ever written. Subsequently he wrote *La Reine de Saba*, 1862; *Mireille*, 1864; *La Colombe*, 1866; *Romeo et Juliette*, 1867; *Cinq Mars*, 1877, and *Polyeucte*, 1878; none of which has any present interest although excerpts are frequently given on the concert platform. His work is full of suave melody and harmony, and his writing for the orchestral parts in his operas is beautifully balanced and restrained.

He also wrote a fairly large number of weak songs and romances, none of which have any value.

Gouraud, Henri J. E. (b. 1867), Fr. general b. in Paris. Rendered distinguished service in Moroccan campaign, 1911-14. In the Great War, he succeeded Gen. d'Amade as commander-in-chief of the Fr. forces in the Dardanelles, having previously commanded the 1st Corps on the Western front. By 1919 he had become Commander-in-Chief of the Army of the Levant. In his able defence in the Argonne sector he earned the sobriquet, the 'Lion of the Argonne.' Was wounded by a shell in 1915, losing an arm. In the Allied offensive July-Aug. 1918, he defeated the Ger. forces east of Rheims. Member of the Conseil Supérieur de la Guerre, 1922. Military Governor of Paris, 1923.

Gourd, the name given to various species of the order Cucurbitaceæ, which are distinguished on account of their fruit. These fruits are nearly always large and fleshy, curiously shaped, and abound in nutritious matter. Most of the Gs. belong to the genus *Cucurbita*, e.g. *C. Pepo*, the pumpkin; the bottle G. or calabash-cucumber is *Lagenaria vulgaris*, with a bitter and dangerously drastic fruit; the snake G. belongs to the genus *Trichosanthes*; the bitter G. or colocynth is *Citrullus colocynthis*, and is allied to the water-melon.

Gourko, Joseph Vladimirovich (1828-1901), a Russian count and general of Lithuanian extraction. His claim to distinction is based on his services in the Russo-Turkish War of 1877, where he greatly distinguished himself, capturing Sofia, Philippopolis, and Adrianople. He also took part in the Crimean War, being stationed at Belbek. For his services in the Russo-Turkish War he was decorated with the order of the second class of St. George. From 1879 to 1880 he was governor of St. Petersburg, and from 1883 to 1894, governor-general of Poland.

Gourmont, Remy de (1858-1915), Fr. author and critic; b. April 4 at the château of La Motte, Bazoches-en-Houlme (Orne). Studied at the Lycée of Coutances, and at the Faculty of Letters at Caen. Went to Paris, and was attached to the Bibliothèque Nationale, 1883-91. His early works, from *Un Volcan en eruption* (1882) to *Les Canadiens de France* (1893), were of the diffusion-of-knowledge type. Then came novels; of which the best-known is *Sistine* (1890). In 1890, helped to found the *Mercure de France*; edited it and several other journals. His style was fastidious, and he indulged

in much philosophic finesse in his essays. Died in Paris, Sept. 27.

Gourock, a tn. of Scotland, in W. Renfrewshire, situated at the mouth of the Clyde, on the l. b. It is 2 m. W. of Greenock and has of late years become famous as a watering-place, having considerable passenger traffic by the Clyde steamers. Pop. 10,136.

Gout. A first attack of G. usually commences by waking the patient up during the night with intense pain in the foot. The next morning there is redness over one or more joints, with extreme tenderness. The pain and swelling last for a week or more and, as a rule, leave the patient feeling better than before. An attack of G., though not serious, is a warning that the patient must reconstruct his mode of living and endeavour, as far as possible, to avoid unnecessary worry, take regular exercise, and be warmly clad, so as to avoid any risk of chill. From the patient's point of view, an appropriate diet is all-important. To deal first with the somewhat delicate question of alcohol—beer, stout, and porter are the most injurious forms; sweet wine comes next, and then spirits, which are the least injurious forms. But, unless the attack is due to a preventable cause, total abstinence is strongly recommended. There should also be distinct moderation in food. A 'purin' free diet should be aimed at, that is to say, one containing the smallest possible amount of nitrogen. For instance, butcher's meat should be restricted, and eggs taken but occasionally. The disadvantages of a restricted diet are that the patient feels he is not getting sufficient nourishment, if leading an ordinary life. It is better, therefore, to commence the regimen during an attack, when loss of appetite is generally present. The patient is then content to live on slops, such as vegetable soups, milk puddings, gruel, arrowroot, etc., while barley water is advantageous in quenching thirst. When the attack lessens and the appetite improves, the patient may be given fried or boiled fish, without any indigestible sauce, chicken, and other forms of white meat. Recurrent attacks of G. are apt to appear with slight cause, or none at all, and to affect an increasing number of joints, which become misshapen and stiff, the attacks becoming prolonged until the pain is almost continuous.

It is of interest to consider that the prime cause of G. is the failure to utilise the food taken, sometimes because too much is taken, sometimes because of the failure of the digestive powers, sometimes because the kidneys are incapable of performing the work required of them. De-

spite the peculiarities of any individual case, these three conditions become more marked, and a more and more rigid diet is indicated, till at length only as much food is taken as can be used and removed by the kidneys. The kidneys are relieved by flushing them out with water, which can be taken first thing in the morning, last thing at night, and in the intervals between meals. If this is not done, the products of digestion circulating in the blood injure the walls of the blood vessels and so weaken them that they may burst. When this result occurs in the brain, the condition is described as apoplexy, and in all parts of the body impaired vessel walls interfere with the nourishment of the parts they supply. When this takes place in the lungs, bronchitis sets in; in the case of the skin, eczema and other diseases result. In addition, the changes in the vessel walls produce changes in the heart and kidneys which are of such extreme severity that they may bring about a fatal result. As G. tends to run in families, the tendency must be counteracted. The children of gouty parents should avoid the errors of their elders, particularly in diet, mode of life, such as exposure to cold, and lack of exercise. Regular exercise acts in two ways: by utilising the products of digestion and increasing the amount of invisible perspiration, less work is thrown upon the kidneys. Further, a gouty parent should seriously consider the question whether his profession or occupation is a suitable one for his children. The treatment of G. mainly depends upon relieving the pain by heat, *i.e.* by hot baths, to which soda may be added, the administration of alkalies and colchicum.

Gouvion St. Cyr, Laurent, Marquis de (1764-1830), a Fr. marshal, b. at Toul. He took part in the Prussian and Polish campaigns of 1807 and 1808, and in August 1812 obtained a victory over the Russians at Polotsk, for which he was created a marshal of France. St. Cyr accompanied Napoleon all through the Russian campaign. On the restoration of the Bourbons he was created a peer, and in July 1815 was appointed War Minister. He d. at Hyères (Var). Besides his military career, he was the author of many works of value, notably of *Mémoires pour servir à l'Histoire militaire sous le Directoire, le Consulat, et l'Empire*. See Gay de Vernon's *Vie de Gouvion Saint-Cyr*, 1857.

Govan, a bor. of Renfrewshire, Scotland, situated on the Clyde, adjoining Glasgow. It owes its importance to the shipbuilding and

other industries of the Clyde, and possesses some of the largest ship-building yards and engineering works of the country. Copper-working, silk-weaving, and the manuf. of matches and electrical apparatus are carried on. Pop. 372,087.

Government implies sovereignty, and the sovereign is defined by Austin to be the person or persons vested with the supreme authority in an independent political society. Such a society is a state and in every state there must be a sovereign power which exercises and controls the functions of G. and conducts and regulates the relations of that political society with other political societies. A single ruler, where there is one, is called the sovereign: the body of rulers, where there are several, is called the sovereign body or the G., or the supreme G. The rest of the members of a political society are called the subjects.

Origin of Government.—The whole subject of G. has ever in the past been productive of what now, in the light of evolution, may be justifiably characterised as sheer dogmatism and *a priori* assumption. Probably no more remarkable theory of the origin of G. or the beginnings of political societies has ever been put forward than that of the social compact. This theory with different philosophers and publicists assumes the formation in some remote period of the past of an original compact whether between the governor and governed, or between all the subjects exclusive of the governor or ruler, whereby it was mutually agreed to surrender all the sovereign powers to a sovereign or a sovereign body for the benefit of all. The theory in its various forms was a reaction against the absolutism of the equally dogmatic patriarchal theory of the origin of G. With Hobbes the social compact was useful in getting rid of the theory of the erection of political societies on a basis of force: a theory which, as it evolved the state from a delegation of 'permanent and inextinguishable power' to the sovereign, gave no room for the existence of justice and moral obligation. Locke reverted to the theory of Althusius and assumed the prince or other ruler to have been a party to a contract by which the sovereign agreed to govern according to the laws and for the public good, while the people on their side agreed to obey so long as the prince remained faithful to his part of the bargain. With Rousseau the theory underwent a radical change. He rejects with indignation the idea of a bilateral contract between sovereign and people, and postulates a literally

social compact. His theory was the revolutionary expression of equality, while those of the Eng. philosophers were eminently consistent with either an aristocratic or monarchic form of G. The doctrine of Rousseau bound all to all and allowed society to exist solely by reference to this free convention of associates. Such a theory is justifiably described by Professor Holland as no more than 'a dangerous truism.' Bentham's utilitarian analysis of the origin of G. by reference to the 'immense interest which men have in maintaining a G.' assumes a similar historical basis. Every form of this theory of the genesis of G. makes the capital error of regarding a political society or state as a conscious human contrivance, as against its far more probable evolution from natural causes. The merit of the theory, however, is neatly expressed by Whewell as 'a convenient form for the expression of moral truths,' and, indeed, it is not to be supposed that all of its exponents necessarily put it on any higher plane. Whether any really satisfactory theory of the origin of G. has ever been put forward is a matter rather to be referred to individual opinion. Spencer advances the idea of the evolution of political power and institutions by a process determined by conditions to the entire exclusion of intentions, the principal condition being war. Jenks thinks there is not the slightest difficulty in proving that all political communities of the modern type owe their existence to successful warfare, and as a natural consequence are forced to be organised on military principles. Maine, harking back to the patriarchal theory, sees the microcosm of the state in the family, expanded and developed into clans and tribes. Seeley inclines to a similar idea of insensible gradations, but regards tribal communities as in themselves states or political societies. He seems to be justified in regarding all political society proper as arising out of some external pressure, e.g. to repel a common foe, or to uphold a common religion or superstition. McLennan and Morgan of the earlier school of evolution conceive of large hordes of people existing as groups anterior to the family as imagined by Aristotle, Maine, and others; but they do no more than bring the family one or two steps forward in chronological order and hardly claim to do more than examine the origin of primeval society in general. There are other theories of the origin of G., notably the ecclesiastical notion of G. by divine appointment, but this, like the philosophical suggestions of the

origin from a social compact, involves assertions which, however consistent they may be with the external phenomena presented by a modern form of G., derive therefrom not a scintilla of positive proof.

Forms of Government.—Aristotle and most later writers have classified the regular forms of G. into (1) Monarchy, or G. by a single person; (2) Aristocracy, or G. by a select council; (3) Commonwealth, or G. by the many. Corresponding to these terms are the forms of tyranny, oligarchy, and democracy; each with a depraved connotation; but the term *democracy* has long since virtually displaced *commonwealth* as the description of a republican polity without connotation of praise or blame. Blackstone, with his usual complacency of opinion, wrote that in a democracy public virtue was more likely to be found than in either of the other forms of G., that in aristocracies there was more wisdom, but less honesty, than in a republic, and less strength than in a monarchy; and that a monarchy was the most powerful form of any because the legislative and executive powers were united in the hand of one prince. But a hybrid and paradoxical form of G. like the limited constitutional monarchy of the British empire presents features which are not readily susceptible of such orthodoxy, while the republican Gs. of the U.S.A. have been characterised by no little corruption, much wisdom, and great strength. Professor Seeley's classifications of societies into tribal, theocratic, and states proper, with an elaborate classification of states by reference to the proportional weight or distribution of governmental authority as between the locality and the central body, is infinitely more in accordance with modern facts. Seeley poured scorn on the respectable classifications of Aristotle and Blackstone, regarding publicists who should adopt them as being in the position of a biologist who, looking at some new animal, should have to admit 'that in some respects it was a wolf, in others a dog.' It is obviously immaterial how Gs. may officially designate themselves, if in substance they do not conform to set patterns. Seeley, like Bluntschli, rejected the Aristotelian classification as useless, because it inquires after one feature only, viz. that of the number of rulers, and results, therefore, in classifying together states of an otherwise totally dissimilar nature. As a scientist should, he omits all politico-ethical considerations, regarding both state and G. not as contrivances of the conscious human will, but as instinctive natural growths. He adopts many cross-

divisions of states based on various considerations, particularly in regard to the degree of local G. and the curtailment of liberty in special directions; liberty in this connotation being primarily freedom from over G., and secondarily as an equivalent to parliamentary or responsible G. Such divisions, if a little bewildering, do undoubtedly conduce to a clearer understanding of the characteristics of different kinds of G. Modern writers, however, are not prone to adopt any classification of forms of G. beyond that into *parliamentary* and *non-parliamentary* (see CABINET, EXECUTIVE), or some other division designed to bring into prominence the degree to which the principles of representation may obtain. With the same idea Gs. are also referred to as autocratic or constitutional. The anct. Grecian states were at first truly autocratic; but the later communities were in the truest sense self-governed, and there never has been so close an approximation to the literal ideal of democracy as the Gk. city state, where every citizen took his turn at the proper business of G. In anct. Rome the G. was, under the kings, the monopoly of an exclusive caste of citizens; while in the later days of the republic was presented the spectacle, as Lord Gowrie expresses it, of the inhabitants of one town wielding the resources of a world-wide empire. On the establishment of the empire, Rome in its declining days fell under the extreme autocracy of Cæsarism, where, in Lord Gowrie's words, 'the Master of the world posed as the humble servant of a menial state,' but in reality exerted complete authority through the military despotism of Rome. In the earlier days of England the feudal form of G. was in its essentials autocratic, but the mutual contractual relations between the king and his vassals and between the latter and under-tenants soon paved the way to a system of representation (see ELECTORATE).

Up to the time of the Great War Russia and Turkey were commonly regarded as being under autocratic forms of G., and post-war developments in those two countries seem only to emphasise this position. But while the Ottoman empire, till comparatively recent times, at all events, lagged far behind the rest of Europe in its adherence to a despotic form of monarchy, the Russian autocracy evolved itself into G. by departments or a bureaucracy (*q.v.*). At the present day Turkey, under the virtual dictatorship of Mustapha Kemal, is under an essentially autocratic republican G.; while the

Soviet G. of Russia is even more autocratic than the pre-existing Tsarist G. In these days any state is considered backward whose governmental powers are vested or remain in a privileged order or caste. That a bureaucratic form of G. spells the negation of civic liberty is shown by the long sustained agitation of the more revolutionary spirits of Russia prior to the Great War against its continuance, the demands for constitutional guarantees, the terrible practice of silencing all freedom of discussion by exile and imprisonment, and the general ignorance of the Russian common people, while its inherent weakness is testified to by the nation's defeat at the hands of the Japanese forces. The Russian Revolution of 1917, though hastened by military collapse, was the inevitable outcome of years of sustained agitation and unrest; but whether the Russian people, if the Soviet form of G. passes away, will secure representative institutions on Western European models, remains to be seen.

Most Gs. of the day are *constitutional* in form, and, as such, subject to varying degrees of popular control. The essence of a constitutional G. is that the executive powers are limited by legal restrictions contained in some written or conventional constitution, and such prerogative powers as may remain to it are, in reality for the most part, popular privileges. Constitutions (*q.v.*) are said to be either rigid or flexible: rigid constitutions are written documents containing fundamental laws or legal principles which cannot be changed otherwise than by some exceptional procedure: a flexible constitution is one, like the British Constitution, which recognises no difference between constitutional and other laws, but permits the legal sovereign parliament to change them at will. Practically, however, there exist in flexible constitutions principles which no parliament would undertake lightly to alter. Most of the great nations of the day, except Great Britain, have adopted rigid constitutions, under which the rights of the subject are expressly guaranteed by the G. The common element of all constitutional forms of G. is that the sovereign legislative powers are really exercised by assemblies of a popular and elective character. Dicey herein distinguishes between parliamentary and non-parliamentary executives (see EXECUTIVE), but whether the council, cabinet, president, or other supreme executive be appointed by parliament or representative body or not, that executive owes its existence to some form of popular vote.

The distinction, however, is important in that it brings out that merit of parliamentary executives or cabinets which consists in the avoidance of collision between the legislature and the G. (see CABINET). In most federal nations the functions of G. are divided between the central G. and the constituent states; there being in most cases written constitutions strictly defining the powers of the former and leaving to the latter all such powers as are not thus expressly taken away. This is so in the U.S.A., but in Canada the authority of the dominion parliament is indefinite, while that of the provinces is defined. The Swiss Federal Assembly, like Congress, can legislate only on a limited number of matters, and it has no power of annulling laws passed by the different canton govts.

But although most Gs. of the day are democratic and constitutional, and the term monarchy in the strict sense as applied, e.g., to Great Britain or Belgium is a misnomer, there are some striking variations, notably in the matter of prerogative powers. In Belgium the king has the right to initiate proposals for new laws, but otherwise his executive power is delegated to a cabinet of representative ministers. Again in France there exists a system of administrative law [*droit administratif* (q.v.)] which appears to Eng. people to be fundamentally undemocratic. By virtue of the co-existence of state or official courts with the ordinary courts, for the trial of acts done in an official capacity, the state officials stand in what seems to be a privileged position. That this system does not in practice involve the negation of popular rights is due to what Dicey terms the 'judicialising' process to which it has been subjected. Again, in Switzerland, although the rulers of the states are annually elected, the same persons are more or less automatically re-elected, and constitute, as it were, a permanent board of control (see also ADMINISTRATION, CONSTITUTION).

Functions of Government.—These are threefold: (1) legislative; (2) judicial; (3) executive or administrative. The first is concerned with the making and altering of laws, the second with the interpretation and application of those laws, and the third with the carrying those laws into effect. In a narrower sense G. is identified with the executive, and this is really the modern connotation of the term. In most states these three functions are vested in separate entities, but in some cases, e.g. in certain crown colonies, all or the first and

last may be vested in a single person or body of persons. The British cabinet illustrates in a striking manner the narrower sense of G. as above indicated. All the most important and far-reaching legislative measures of recent years have been introduced into parliament by responsible ministers, and the skill, tact, and ingenuity of those ministers in 'piloting' their bills through the Lower House, coupled with the fact that the Parliament Act has virtually abolished two-chamber G., so identify these measures with the ministry that the remaining members of the House of Commons more and more assume the rôle of an automatic voting assembly, the majority in which is pledged to support the ministry of the day. Where, however, the ministry really reflects the opinion of the majority of the electorate, the principle of representative G. is in no wise disturbed, and it can hardly be doubted that the strong cohesive action of a unanimous cabinet faithfully endeavouring to interpret the popular will does make for efficiency and dispatch in the functions of G.

It was, and even now is, a moot point how far G. in the widest sense is justified in interfering with the free action of the individual. Mill was the apostle of the theory of *laissez faire*, a theory which would leave the sphere of voluntary action as large as possible (see CENTRALISATION). It is not putting it too high to say that this question is now no more than academic, for that the opposed theory of G. interference in practically every conceivable social relation is the accepted order of things is, at all events in England, demonstrated not only by an imposing series of Acts like the Factory Acts, the Education Acts, the National Insurance Act, regulating the whole industrial and educational life of the people, but by the activities of a veritable hierarchy of local governing bodies administering a host of Acts relating to public health and local G. generally, and making bye-laws in conformity with such Acts.

After the Great War, the intrusion, in Great Britain, of the G. in the economic sphere, was accentuated by the policy of 'Reconstruction'—a policy which appeared to be warranted by the spectacle of a world completely disorganised by the temporary necessities of war. Collectivist opinion saw in governmental control the only way of salvation; and the first effect of war-time experience lent support to this theory, because private enterprise had proved unequal to the sudden and unprecedented strain on

its resources. But while collectivism produced good results for the purposes of the War, inasmuch as the co-operation of men of good-will was ungrudgingly given to the state, that co-operation was only given at what proved an intolerably high cost, and the continuance of any system of collectivism in normal times produced an inevitable reaction and strong criticism. Force was lent to this criticism by the results of governmental help to industry: productive industry was clogged by the burden of taxation; commerce was hampered by difficulties of exchange; credit was restricted; capital was scarce and dear; and labour was restless. These results may be all primarily assigned to the mistaken policy of endeavouring to rebuild a broken world without giving it time to recover in the ordinary course of things. In the years immediately following the War, it was suggested by some Eng. statesmen and publicists that the experience of the War revealed in England the essential weakness of the old Cabinet system. Doubtless the Cabinet had become unwieldy, with the result that much of the more important work of the G. was transacted, not by the Cabinet, but through the agency of an informal inner Cabinet. Lord Curzon, a great authority, roundly declared that the old system had irretrievably broken down both as a war machine and as a peace machine (House of Lords debate; June 19, 1918). He predicted that in future the presence of other Ministers than Cabinet Ministers at Cabinet discussions would become an inevitable feature of Cabinet procedure and that the system of devolution and decentralisation of G. work would be considerably developed. Yet by 1920 the Cabinet once more consisted in the main of Departmental Ministers; its numbers had not been substantially reduced, and the principle of collective responsibility again prevailed. The experiments of the 'War Cabinet' and the 'Imperial War Cabinet,' effective in the time of war, did not become, as was hoped by Mr. Lloyd George, 'an accepted convention of the British Constitution.' (See also CABINET, IMPERIAL WAR.) In 1917 a committee was appointed by the Minister of Reconstruction to inquire into the responsibilities of the various departments of the Central Executive G., and to advise in what manner the exercise and distribution by the G. of its functions should be improved. This 'Machinery of G. Committee' under the chairmanship of Lord Haldane (*q.v.*) suggested

in its report that the business of the various departments of G. should be distributed as far as possible according to the nature of the service with which they were concerned; and, on that principle, it was proposed to reduce the number of departments and simplify the functions of the state, but to increase the number of ministers. The weakness, however, of this report was that it contemplated the intrusion of the state into every corner of social and industrial activity, and it is hardly a matter for surprise that the proposals were not implemented, though two new departments of state, the Ministry of Transport and the Ministry of Labour, have been created. It is not, however, to be doubted that these Ministries perform extremely useful functions, and functions which do not involve intrusion but rather co-operation in the industrial world.

Bibliography.—Bryce's *The American Commonwealth*, 1911; Bagehot's *English Constitution*; Lowell's *Government and Parties in Continental Europe*, 1896; Bluntschli's *Theory of the State*; Lowell's *Government of England*, 1908; Dicey, *The Law of the Constitution*, 1908; Sidney Low's *Governance of England*; Seeley's *Political Science*.

Government's Island, an island belonging to the U.S.A., in the R. Mississippi, situated between Rock Island City and Davenport, containing arsenals and armouries.

Governor, Colonial. The king is represented in the colonies by Gs. appointed by commissions under the Royal Sign Manual conferring upon them their powers together with instructions defining their duties. Gs. are appointed during the royal pleasure, but do not generally retain office for more than five or six years. The extent of the powers and duties of a G. varies with the constitution of the colony, and has recently undergone profound modification (see GOVERNOR-GENERAL). In self-governing colonies he is in the position of a constitutional monarch who acts on the advice of responsible ministers, but in the case of crown colonies (*q.v.*) he is an autocrat exercising both legislative and administrative powers subject only to the control of the Colonial Office. *Inter alia* the powers and duties of a G. are: (1) To assent to, or withhold assent from Bills passed by the local legislature, except in certain cases such as currency, army and navy, and foreign treaty matters, where he must reserve them for the royal assent (see COLONIAL LAW); (2) to pardon criminals and remit fines and penalties; (3) to issue warrants for the

expenditure of public money; (4) to appoint and dismiss public servants; (5) to grant licences for marriages, letters of administration, and probate of wills; and (6) to defend the colony against external aggression. A G. is entitled to obedience and assistance from all civil and military offices in the colony. He is not entitled to leave the colony without royal permission. He has no authority over British ships, but should he require their assistance, he must communicate with the Colonial Office save where the lives of British subjects are endangered, when he may ask for such assistance directly from the navy. The celebrated cases of *R. v. Wall* and *R. v. Eyre* establish that a C. G. can be tried in England for crimes committed in the colony in his official capacity. See *Tarring's Law relating to the Colonies*; *Chalmers' Outlines of Constitutional and Administrative Law*, 1910.

Governor-General. The status and functions of a British G.-G. have been radically changed as a corollary to the altered status of the great self-governing dominions. The Imperial Conference of 1926 made an important declaration through the Report of its Inter-Imperial Relation Committee, to the effect that the G.-G. of a Dominion was now the 'representative of the Crown, holding in all essential respects the same position in relation to the administration of public affairs in the Dominion as is held by His Majesty the King in Great Britain, and that he is not the representative or agent of His Majesty's Gov. in Great Britain or of any department of that Gov.' This declaration necessitated a change in the procedure for the appointment of G.-G., and accordingly the Imperial Conference of 1930 arrived at the following conclusions: (1) the parties interested in the appointment are the King and the Dominion concerned; (2) the constitutional practice that the King acts on the advice of responsible ministers applies in this instance; (3) the ministers who tender and are responsible for this advice are the ministers in the Dominion concerned; and (4) the ministers tender their formal advice after informal consultation with the King. The Conference also declared that the channel of communication between the King and the Gov. of any Dominion was a matter solely concerning the King and such Gov., and they recorded that the Gov. in the United Kingdom had expressed its willingness to act in relation to any of the King's Govs. in any manner in which that Gov. might wish. Finally,

it was declared that the manner in which the instrument containing the G.-G.'s appointment should reflect the principles accepted by the Imperial Conference was a matter for the advice of the ministers in the Dominion concerned. The position now therefore is that the Home Gov. is not consulted, though the appointment of the Earl of Clarendon in S. Africa in 1929 and of Mr. Tim Healy in Ireland two years previously seemed to show that the Home Gov. still retained a share in the advice to be given to the King. At all events, the constitutional functions of the Sovereign remain unimpaired by the changes, the old aspect of the Royal Prerogative is unchallenged; and the King can approve or reject any nomination. The G.-G. having ceased to be the channel of communication between Gov. and Gov., consideration was given to the question of securing some kind of representation of the Home Gov. in the Dominions, and the most natural solution was the appointment of a High Commissioner to correspond with the Dominion High Commissioners in London. The first Dominion to receive such a representative was Canada, when Sir William Clark (*q.v.*) in Sept. 1929 was appointed High Commissioner for Great Britain in Canada. At the moment (1931) no similar appointment has yet been made in any of the other dominions. These changes have synchronised with or possibly may be said to be symptomatic of a desire in some political circles in the Dominions for the appointment of an indigenous G.-G. This happened in the case of the appointment of Mr. Tim Healy (*q.v.*) to be G.-G. of the Irish Free State; while in 1930 Mr. Isaac Isaacs, Chief Justice of Australia, was appointed G.-G. of Australia, the appointment, which gave rise to some controversy in both countries, being made on the nomination of Mr. Scullin, prime minister of the Commonwealth. (For mode of appointment and powers see under GOVERNOR, COLONIAL; and also under COLONIAL LAW.)

Gow, Neil (or **Niel**) (1727-1807), a Scottish violinist and composer, father of Nathaniel (1766-1831). He was early reputed to be the best performer of reels and strathspeys in Perthshire, and noted for his skill in bowing. Raeburn frequently painted his portrait for his numerous patrons, the chief being the Duke of Athol. See *McKnight in Scots Mag.*, 1809; *Grove, Dict. of Music*, ii.; *Chambers, Eminent Scotsmen*, ii., 1855; *Glen, Scottish Dance-Music*, ii., 1895.

Gower, or **Gwyr** (crooked), a peninsula in Glamorganshire, Wales,

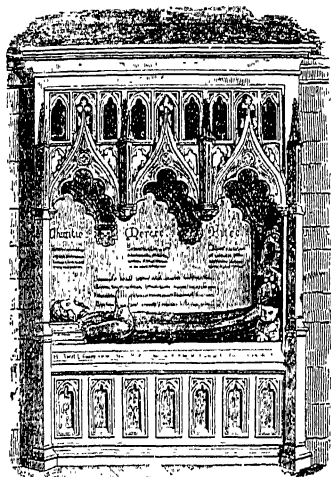
situated between Swansea Bay and the Burry Inlet. Its rocky coast-line is principally composed of limestone, with numerous caves, and the scenery is magnificent. In the eleventh century it was overrun by the Normans, who built castles and churches. In the reign of Henry I. it was inhabited by the Flemings, the descendants of whom still live there. It contains picturesque ruins, and supposed Druidical remains. Pop. of G. rural dist. (1911) 8622.

Gower, John (c. 1325–1408), one of the earliest Eng. poets, probably of good family, perhaps connected with Sir R. Gower, a landowner both in Suffolk and Kent. He seems to have

(c. 1336), completed by 1394. First dedicated to Richard II., it was afterwards transferred to Henry of Lancaster (Henry IV. by 1399), on which and other grounds G. has been called a timid time-server. The *Confessio* was one of the first books printed by Caxton (1483). It consists of a Prologue and eight books of over 100 stories taken from Ovid, Valerius, Maximus, Justin, *Gesta Romanorum*, chronicles of Cassiodorus and Isidorus, Godfrey of Viterbo's *Pantheon*, and other sources. His *Cinquante Balades* were printed for the Roxburghe Club, 1818. His work is mostly tedious and uninspired, but he deserves respect for his painstaking if monotonous verse, and for his influence on Eng. literature down to Shakespeare's time. See editions of the *Confessio* by Pauli, 1857; Morley (Carisbrooke Library), 1889; Macaulay's *Works of J. Gower*, 1899–1901. His tomb is in St. Saviour's (old St. Mary Overies), Southwark. Consult Warton, *Hist. of Eng. Poetry*, 1781; Ellis, *Specimens of Early English Poets*, i. 1790; Lowell, *Conversations on some of the Old Poets*, 1845.

Gowrie, Carse of, see CARSE OF GOWRIE.

Gowrie Conspiracy, a mysterious event in the history of Scotland, which took place in Aug. 1600 and resulted in the slaughter of the earl and his brother by the attendants of James VI., afterwards James I. of England, at Gowrie House, Perth. John Ruthven, third Earl of Gowrie, and his brother, Alexander Ruthven, were, at the time, living on the earl's estate at Perth, and early in Aug. the king, with a few attendants, visited the castle to confer with the earl regarding a debt. There seems to have been ill-feeling at the time between the two, on account of the earl's father having been put to death by King James for treason; and the king also owed Earl Gowrie a large sum of money. After dinner, on the evening of Aug. 5, 1600, Alexander Ruthven is said to have taken the king to a private study, while his brother, the earl, was engaged with other guests, and here James was confronted by an armed man, who, as appeared, was none other than Gowrie's servant, Henderson. Alexander Ruthven thereupon drew Henderson's dagger and presented it at the king's breast, threatening to kill him on the spot if he cried out for help, but that his life should be safe if he remained quiet. He then left King James in the custody of Henderson, who professed ignorance of any plot, and at the king's request opened one of the windows, when Alexander Ruthven returned, and



GOWER'S MONUMENT IN ST. SAVIOUR'S CHURCH, SOUTHWARK, LONDON

been a personal friend of Chaucer, who called him 'the moral Gower' in dedicating to him *Troilus and Cressida* (1372–86). He married late, and became blind about 1400. G. wrote three long poems—the *Speculum Meditantis* (originally *Hominis*) in Fr. verse (c. 1378), found at Cambridge, 1896, by G. C. Macaulay; *For Clamantis*, in Latin elegiacs, 1382–4, dealing with Wat Tyler's rebellion (see Cox's ed. for Roxburghe Club, 1850), to which was added *Chronica Tripartita* on Henry IV.'s accession. See Wright, *Political Poems*, i. (c. 1855), and Fuller, *Church History*, ii. 1655; and *Confessio Amantis*, in Eng. octosyllabic verse

on seeing the king about to call for help, struggled with him. James, however, managed to reach the window and cried out 'Treason!' to his followers below, who ran up the staircase to the king's help, led by John Ramsay, afterwards Earl of Holderness. They found James struggling with Ruthven, whom Ramsay managed to wound and push down the stairway, where he was subsequently killed by one of the king's followers. Gowrie then entered upon the scene, and seeing his brother's dead body, rushed into the *mêlée* and was killed himself. The noise of these proceedings caused some commotion in the town, but it quickly subsided. The tragedy, however, caused intense excitement throughout Scotland, and all the details of the investigation into the circumstances were reported to Elizabeth's ministers in England. The estates of the Ruthvens were confiscated, their name and honours abolished, and the house in which the strange event took place destroyed. It has been suggested, in explanation of the mystery, that the Ruthvens were Queen Elizabeth's tools, and that she may have wished to secure possession of the king's person in order to control Scotland in her own interest. On the other hand, there may have been no plot, but simply a quarrel over a debt leading to a struggle which ended in violence. Those politically hostile to James said that, with the help of the court, he had invented the story to cover his own fault and his design to extirpate the Ruthven family. This idea has never been entirely abandoned, and some colour was given to the belief by the relentless severity with which James eventually pursued the two younger, and undoubtedly innocent, brothers of the earl. They both fled to England at the time; but after the accession of James to the throne, one escaped abroad, while the other was imprisoned for nineteen years in the Tower of London. Whatever may have been the true facts of the case, the discrepancies in the evidence produced at the time cause the event to rank amongst the unsolved enigmas of history. See Andrew Lang, *James VI. and the Gowrie Mystery*, 1902, and the authorities there cited; Calderwood, *History of the Kirk of Scotland* (Edinburgh), 1642-49.

Goya, a tn. and port of Corrientes, Argentine Republic, on the Rio Parana. It was established in 1807 by Captain Goya. It is served by the Central, Entre Rios, and N.E. railways and is a distributing centre for agricultural products and timber. Pop. about 16,000.

Goyana, or Goyanna, a city of Brazil, in the prov. of Pernambuco. It is a trade centre for sugar, coffee, tobacco, rum, cattle, cotton, etc. The Dutch held possession of it from 1636 to 1664. Pop. about 53,000.

Goya y Lucientes, Francisco José de (1746-1828), a Spanish painter, *b.* at Fuendetodos in Aragon. His passion for painting was awakened by a monk of Santa Fé, near Saragossa, and at the age of sixteen he was admitted into the studio of José Luxan Martinez. Here he participated in the quarrels of painters, and after one of these street fights had to flee to Madrid. He afterwards went to Italy and settled in Rome, where he met Louis David, but in 1774 returned to Spain. His work, like his career, is wild, but is very fine in execution, and his paintings include church pictures in fresco and in oil, portraits, etchings, and engravings. He was made *pintor de camera* by Charles IV. in 1789, and G's portrait of Charles shows that he excelled in portraiture, 'The Caprices,' 'The Disasters of War,' and the thirty-three plates of scenes in the bull-ring are perhaps his best work.

Goyaz, the central state of Brazil, including all the territory between the two branches of the rivers Tocantins and Araguay, nearly the whole basin of the principal one, from its origin, and the high valleys of the Paranahyba-Parana. Its climate is sub-tropical, and the soil is not very productive, though tobacco is exported. Cattle-grazing is extensively carried on, and gold, iron, diamonds, mica, and copper are mined. Neither of the rivers between which the state lies is navigable, so the only outlet for the state is by means of mule trains until the railways are extended from São Paulo and Minas Geraes. The capital is Goyaz or Villa-Boa de Goyaz, a mining town on the Rio Vermelho. It is the see of a bishopric and possesses a small cathedral. Pop. 21,000. (State area 254,834 sq. m.; pop. about 875,000.)

Goyen, Jan van (1596-1656), a Dutch painter, *b.* at Leyden. He spent the greater part of his life at The Hague, and in 1640 was elected a member of the Painters' Guild. He was one of the earliest of the Dutch landscape painters, and owing to the greyness of his colours, his sea and river pieces are the most valued. He also studied atmospheric effects in black and white.

Gozo Island, or Gozzo (anct. *Gaulos*), a British island in the Mediterranean, 4 m. N.W. of Malta. It is 9 m. long, and 4½ m. wide, and is composed of coralline and gligigerina limestone, with tracts of marl and

blue clay. The chief town is Victoria (formerly Rabato), and on the S.E. coast is Fort Chambray. The Giant's Tower is the chief object of interest on the island. Pop. 22,500.

Gozzi, Count Carlo (1722-1806), an Italian dramatist, brother of Gasparo, *b.* at Venice. He was a member of the Granelleschi Society, which was especially zealous to preserve the anc. Italian literature, and became famous for his wit by the publication of his satirical poem *Tartana degli Influssi per l'Anno Bisestile*, 1757, and his comedy *Fiaba dell' Amore delle tre Melarancie*, 1761. This latter, which was acted by the Sacchi company of players, was very successful, and led to the production of a series of dramatic pieces based on fairy tales. Of these the best example, perhaps, is *Turandot, Princess of China*, which was translated by Schiller. He also translated Calderon's dramas, and published his autobiography, which is very amusing. His dramas, though praised by such eminent men as Goethe, Sismondi, and Tieck, have long since disappeared from the stage, and are very scarce even in their printed form.

Gozzi, Count Gasparo (1713-86), an Italian poet and essayist, *b.* at Venice. His works are remarkable for the purity of their language and the elegance of their diction. His *Sermoni* are written in the style of Horace, and *Il Mondo Morale* shows the wonderful organisation of a philosophical mind. His version of Lucan, too, is remarkable, and his *Difesa di Dante* puts him in the first rank among commentators. He also acquired great reputation by the publication of *Osservatore Veneziano*, a paper compiled in imitation of the *Spectator*. He spent some years of his life at Venice, where he was busy translating dramas (chiefly from the Fr.) for the Theatre Sant' Angelo, and he was also censor of the Press in that city for a considerable period. His last years were passed in Padua.

Gozzoli, Benozzo (1420-98), an Italian painter, *b.* at Florence. He was an assistant of Fra Angelico, and is chiefly famous for his work in fresco. His largest and most important piece was begun in 1469, and took sixteen years to accomplish. It consists of a series of twenty-four designs drawn from Bible history, and is in the Campo Santo at Pisa.

Graaf Reinnet, a tn. in Cape Colony, about 58 m. from Middelburg. It is one of the oldest towns in the colony, and is noted for its gardens, vineyards, and choice fruit. It is also the terminus of one of the railway lines from Port Elizabeth. Mohair and

merino wool are produced in the district. Pop. European (1926) 4576, others (1921) 4763.

Grabbe, Christian Dietrich (1801-36), a Ger. dramatist, *b.* at Detmold. He studied law at the University of Leipzig, but soon abandoned this to devote himself to literary work. In 1822 he determined to become an actor, and wrote the drama *Herzog Theodor von Gothland*. This was not really successful, and G. went to the University of Berlin and passed his advocate's examination in 1824. He afterwards practised as a lawyer in Detmold. He is remarkable for his poetic genius, and his dramas contain some very fine passages, but his work is marred by indelicacy. His best works are: *Don Juan und Faust*; *Friedrich Barbarossa*; *Heinrich VI.*; and *Napoleon, oder die Hundert Tage*, which places the battle of Waterloo upon the stage.

Gracchus, Caius Sempronius (158-121 B.C.), the younger brother of Tiberius and like him was an ardent reformer of the wrongs suffered by the people, but went much further than Tiberius. He served as quaestor in Sardinia for two years, and on his return in 124 stood for the tribunate and was elected, and re-elected at the end of 123. He at once began his reforms; he procured the exile of Popilius, the consul who had proceeded against his brother's followers, and proposed a law that all who had been deprived of any office by the people should in future be ineligible for any other office; this was aimed against his brother's opponent, Octavius. By these measures he revenged his brother's death. He next struck at the power of the senate by enacting that the 'judices' should be chosen from the 'equites,' not as before from the senate, and that the senate should decide the provinces which the consuls should have before their election. He also rearranged the whole taxation of the new province of Asia, and won over the Rom. mob by his corn law; by this enactment any citizen might every month buy of the state, at about half the cost price, sufficient corn for his own livelihood. To relieve the economic distress he renewed his brother's agrarian law and set on foot a scheme of colonisation, and he also proposed that the franchise should be given to all Latin communities, and that the rest of Italy should receive Latin rights. This last was most unpopular, and the senate induced Livius Drusus, another tribune, to come forward with extravagant proposals in the people's interest, proposals which could not possibly be fulfilled. The plot was successful; G. failed to secure re-election for 121; a riot

followed in the Forum, and he was slain with 3000 of his followers. He was a great orator, and was the first of Rom. orators to employ violent action when speaking.

Gracchus, Tiberius Sempronius : (1) (c. 167-133 B.C.) Brother of Caius and son of Cornelia, by whom he was trained after the death of his father. He was quaestor in Spain with the consul Mancinus in 137, and took part in the war with Numantia. In 133 he was elected tribune, and brought forward his agrarian law; it enacted that no person should have more than 500 jugera of land as his absolute property; that if he had more it should revert to the state and be portioned out in small lots at moderate rents to the poorer citizens. He also proposed to distribute the wealth of Attalus, King of Pergamus, which had just been bequeathed to Rome, among the recipients, to enable them to stock their land. The Bill met with great opposition from the senate and capitalists, but G. succeeded in getting it passed. He was killed by a mob of senators, headed by Scipio Nasica, when he was seeking reelection. (2) (c. 210-151 B.C.) The father of the tribunes and husband of Cornelia, the daughter of Scipio Africanus the Elder. He was tribune in 187, and spoke on behalf of the Scipios when they were accused of bribery after the war with Syria. In 181 he went as praetor to Hither Spain, and won the respect and affection of the inhabitants by his strict sense of justice. In 177 he was consul, and suppressed a revolt in Sardinia. In 169 he was censor and showed himself an opponent of the capitalists, and in 163 again consul. (3) (*f.* third century B.C.) Distinguished himself in the second Punic War. In 215 he defeated the Capuans, in 214 he was successful near Beneventum, and in 213 carried on war in Lucania. Here the next year he was betrayed into the hands of the Carthaginian Mago.

Grace (Lat. *gratia*, favour; Gk. *χάρις*). This word frequently occurs in the Scriptures, especially to convey the idea of an exceptional favour or unmerited benefit freely bestowed by God without any idea of reward or return. It signifies, above all, the spontaneous outpouring of God's love to fallen mankind. Theologians speak of G. as (1) common or general and (2) special or particular, the latter referring to the intervention of the divine love whereby sinners may be brought to repentance and salvation. This is also known as 'selecting, justifying, or sanctifying G.,' and in respect of man as 'imputed or inherent G.' St. Paul

emphasises the necessity of G. for the regeneration and salvation of man, contrasting it with debt (Rom. iv. 4), with works (Rom. xi. 6), with law (Rom. vi. 14). Those who are in enjoyment of divine love and forgiving mercy are said to be 'in a state of G.' For various uses in the N.T., see Eph. ii. 5, iii. 8; 1 Cor. xv. 10, 2 Cor. viii. 7; 2 Peter iii. 18. The term 'year of G.' for a year of the Christian era is derived from this sense of favour or mercy shown. The word has formed the central subject of various theological controversies. Pelagius considered that divine G. merely assisted free-will (see also CALVIN, JOHN, and ARMINIUS, JACOBUS). Rom. Catholics mostly adopt the doctrine of 'synergism' (co-operation of G. and free-will), while Protestants believe in the existence of a preparatory and prevenient G. which gives rise to every good impulse. The question whether the efficacy of the Sacraments as 'channels of the divine G.' depends on the faith of the recipient or not has long formed a disputed point between Catholics and Protestants. See Dorner, *System of Christian Doctrine*, iv., 1886.



W. G. GRACE

Grace, Edward Mills (1841-1911), Eng. cricketer; b. Nov. 28, at Downend near Bristol; third son of Dr.

Henry Mills Grace and elder brother of 'W.G.'—like whom he followed the medical profession. Played at Lords first in 1861. In Australia 1863-64. In great international match, 1880. A famous fielder at point. Four times married. Died at Thornbury, Glos. (where he was coroner), May 20.

Grace, William Gilbert (1848-1915), a famous Eng. cricketer, *b.* in July at Downend, near Bristol. He became famous as a cricketer at an early age, and played for S. Wales in 1864. He was very soon recognised as the best batsman in England, and took part in tours to Canada, the U.S.A., and Australia. His highest score in first class cricket was 344, while his highest aggregate for one season was 2739, made in 1871. He was also efficient as a bowler, and took 192 wickets in 1875. By profession a doctor, he studied at St. Bartholomew's Hospital, London, and in Edinburgh, and practised in Bristol, where he captained the Gloucestershire county team till 1899. In 1879 he received a testimonial of £1400, and in 1895 a further one of £5000. He published *Cricket* in 1891, and also wrote *Cricketing Reminiscences*, 1899, and *W. G.'s Little Book*, 1909.

Graces, *see* CHARITIES.

Gracian, Baltasar (c. 1601-58), a Spanish writer, *b.* at Calatayud. Little is known of his life, except that he was a Jesuit of Aragon. He is chiefly famous for having followed up the affected classicism which was popular in the seventeenth century under the name of 'Gongarism.' His chief work was *Criticón*, which is allegorical, and which has been compared with the *Pilgrim's Progress*. Most of his books were not published under his own name. Other works of his are: *Agudeza, y arte de ingenio*, a manual of rhetoric; *El Oraculo manual y arte de prudencia*, a system of rules for the conduct of life; *El Héroe*, which describes the qualities of an ideal man.

Gradient of a railway is the rate at which it rises or falls above or below the horizontal, and is generally expressed in terms of the distance travelled to gain or lose one foot in height. The ruling G. of a section of railway is the steepest incline in that section, and is determined by the character of the country to be traversed, as well as by the state of finance. A moderate G. is 1 in 200, while 1 in 100 is heavy. The Great Western, when laid out by Brunel, had a G. of 1 in 1320 for a long distance out of London, but later engineers improved on this. The maximum G. possible depends on the climate, a dry one being most

favourable; the limit is about 1 in 16.

Grading and Conditioning. Grading is the action or process of sorting goods into grades according to their quality. Conditioning, in textile industries, especially the silk trade, is the process of determining the quality and net weight of the raw material when freed from moisture and impurities, a testing of the condition of silk, yarns, or other articles. A 'conditioning-house' is an establishment where such materials may be prepared and arranged and sampled at fixed charges, and an official warranty as to their condition be obtained. A public establishment for the purpose has existed at Lyons since 1779. (*See Nouveau Dictionnaire d'Economie Politique*.) They are at present little known in the United Kingdom, the Trade Silk Condition Co., Ltd., of Worship Street, E.C., being the only example in London. Descriptions of the raw materials and the admixtures contained by fabrics are given. These organised systems for testing the worth of commodities and insuring uniformity of quality are highly beneficial. The relative thickness of textiles is expressed by numbers, showing the weight of the yarn per given length. Even after the international congress on the silk trade (1873-74), the grade is still variously expressed in different countries. In England, for spun silk, it is expressed by the number of skeins (840 yds.) that weigh one pound. *See* Simmonds, *Dict. Trade*, 1858; *Dict. of Polit. Econ.*, i. and ii., 1894.

Graduation, the process of dividing any given scale, straight or circular, into a given number of parts. As the whole accuracy of an observation with any instrument depends primarily on the correctness of the scale in use, extremely accurate G. is an essential. It was probably the advance of astronomy that first called for a special study of this subject, in comparatively recent times, and the first really important attempt to obtain special accuracy occurred in the early part of the eighteenth century. To-day the very wide use of sextants, surveying and astronomical instruments has demanded a very high state of perfection. Much of the work now is done by copying an accurate scale by machine, but as the copy itself has first to be constructed, it is well to deal first with *original* G. The scales in use are of three kinds, straight, arcs of circles, and complete circles; and in the last two cases the G. is in degrees and fractions of a degree. In nearly all cases, so far as is possible, the method of continual bisection is adopted. By the methods

of pure geometry it is possible to bisect an arc, and to divide a line into any given number of parts, but in actual practice these are found to be far too clumsy and inaccurate. In graduating a straight scale, the whole length is accurately laid down, and is then bisected as follows: Any arc as nearly as possible equal to half the length is laid off from each end (by means of a beam compass), and if the marks coincide, the middle point is found; but if not, as is nearly always the case, the short distance is bisected accurately by hand with the help of a lens. Each part in turn is then bisected, and so on. If necessary, the subdivisions in their turn must be bisected or quinquesectioned until the required marks are obtained. An alternative method is known as *stepping*, by which the required division is taken and marked off successively by the use of spring dividers. Obviously, if any error is made in the original division, this is multiplied at each successive division. The points may, however, each be altered by use of a dividing punch, but much alteration is very undesirable. The G. of circular arcs is in general done by the same method. The arc of the circle itself on which the graduations are to be made is first laid down, and an arc of the same radius laid off along it to give 60° . This is bisected, giving 30° , and half the arc laid off on the other side of 60° , giving 90° . Each division is bisected, then trisected, giving marks of 5° . Each is quinquesectioned, giving single degrees, and each degree is twice bisected and then trisected, giving twelfths of a degree. In some cases a second scale has been graduated on an arc concentric with the first, and divided entirely by continual bisection, to act as a check. In graduating an entire circumference additional tests of accuracy may be made. Troughton first of all constructed a roller whose circumference was exactly one-sixteenth of the given circumference. The circumference of the roller was divided accurately into sixteen parts. The roller was fixed to the work by means of a framework which allowed it to be rolled round the circumference without slipping. As each division of the roller came in contact with the work, a point was marked by the help of microscopes; and by this means the whole circumference was divided into 256 equal parts. The error of each point was then tested and finally corrected by means of microscopes with cross wires moved by screw heads at points diametrically opposite. Each of the 256 divisions was then divided into $16\frac{1}{2}$ equal parts with the subdividing sector, so that each final division

measured one-twelfth of a degree. When once an original scale is made, copying may be done by hand or machine. If a straight scale is to be exactly copied, it is firmly clamped to the work, the dividing square is laid across, and the marks made by means of the dividing knife. If necessary, the new scale may be made proportionally larger or smaller by fixing it at an angle to the copy. The dividing square is then applied to the copy and notches made; the divisions being finally marked with the knife by applying the square to the new scale. In a similar way a circular scale may be copied. The copy is known as the dividing plate, and is provided with a movable radius. But most copying at the present day is done by a machine known as the dividing machine. The new scale is firmly affixed to the dividing plate and made concentric with it. The dividing plate is then turned mechanically through small angles successively, being stopped accurately by means of a tangent screw at each division. At each stop the dividing knife, moving along a radius of the dividing plate, cuts a new division; and thus the new scale is quickly and accurately made. The machines at present in use contain one improvement, due to Simons, by which the copying is done with greater accuracy from a large circle to a smaller one.

Gradus ad Parnassum ('a step to Parnassus'), a dictionary, either Latin or Greek, in which the quantities of the vowels are marked. It contains synonyms and poetical expressions and extracts, and is most useful to students for verse composition. The first Latin *gradus* was published in 1702, and was the work of the Jesuit Paul Ater.

Graeco-Turkish War, 1921-22. This war arose out of the Turkish refusal to accept that term of the Treaty of Sèvres (*q.v.*) which purported to mandate Smyrna to Greece. Mustapha Kemal (*q.v.*), after the Allies had signed the treaty (Aug. 10, 1920), set up a *de facto* Nationalist gov. at Angora and at once made preparations for war with Greece, whose forces were in occupation in Asia Minor under General Paraskevopoulos. After the Great War, M. Venizelos cherished dreams of a *Magna Graecia* extending over a large part of Asia Minor and the islands off the W. coast of that country, and he relied to some extent on the moral and even material support of Great Britain for the realisation of this ambition. Kemal, on the other hand, was encouraged by the Franklin Drouillon Agreement of Oct. 1921 to rely on the moral

support of France, particularly as the somewhat mysterious Franklin Bouillon had evidently acted in a semi-official capacity in lending aid to the Turks in the shape of arms. Much, too, had been accomplished by Venizelos, after the fall of King Constantine, to improve the organisation of the Gk. army in Asia Minor; but his power waned, largely owing to the traditional love of the Gk. people for their dynasty; and, after the death of King Alexander in 1920, Venizelos failed to secure a majority at the general election, notwithstanding the notorious fact that General Paraskevopoulos was in favour of further military intervention on his behalf and worked to secure a Venizelist majority in the polling at the front. When King Constantine returned in 1920 to the throne, he restored to the Gk. army the officers who had been loyal to himself, but retained also the pro-Venizelist officers; the result was that the Gk. army was divided in its counsels as well as in its political sympathies. This was the state of things in 1921 when, on March 23, the Gks. launched their offensive in Asia Minor. At first the offensive seemed to meet with a fair measure of success. In April, however, the Gks. were defeated near Eskishehr, and withdrew towards Ushak. The offensive was resumed from Ushak and Brusa in July; and on July 20 the Gk. forces were back again in Eskishehr. The Turks made a strategic retreat to the Sakaria R., ostensibly to defend their new capital Angora; the Gks. continued to advance, but hesitation subsequently marked their further movement, and the Turks turning on them in Sept. heavily defeated them. The Gks. then retired on Eskishehr once again, and succeeded in repelling several Turkish attacks at Afion Karahissar in Oct. Winter having set in, the situation remained quiet for over seven months, during which time Kemal completely reorganised his army, and on July 26, 1922, a general Turkish offensive was begun. Throughout Aug. and Sept. the Gks. were in headlong flight; Smyrna was evacuated by the Gk. garrison in the latter month, and was then burned by the Turks (Sept. 14). Complications might have ensued at Chanak and Ismid with the British forces under Sir Charles Harington (*q.v.*), but the Mudania Convention or Armistice between Sir Chas. Harington, for the Allies, and Kemal averted further war (Oct. 1922). Discussions between the Allies and Turkey were protracted, and it was not until July 24, 1923, that the Treaty of

VOL. VI.

Lausanne was signed, which, *inter alia*, recognised Turkey's right to Asia Minor. Much light is thrown on the pitch of demoralisation to which the Gk. army had fallen in 1921 by the history, *Towards Disaster: The Greek Army in Asia Minor in 1921*, by Prince Andrew of Greece (1930).

Graetz, Heinrich (1817-91), a German historian, *b.* in Posen. He went to Breslau in 1842, where he met the leader of Jewish reform, Abraham Geiger, and was much opposed to his teaching. G. himself advocated freedom of thought, but did not see the necessity for freedom of ritual. He became famous by the publication of his history of the Jews in 1853, which produced a greater sensation than any other Jewish book of the nineteenth century; and he was recognised as a master of Jewish history. The book is the work of genius, though G. is often biassed in his views and lacking in sympathy. His *Geschichte der Juden* was completed in 1875, and has been translated into many languages.

Graevius, Johann Georg (1632-1703), a German classical scholar, *b.* at Naumburg, Saxony. He was historiographer royal to William III. He published editions of Cicero, Hesiod, Lucian, Suetonius, Catullus, and *Thesaurus antiquitatum Romanarum*, etc.

Graf, Arturo (1848-1913), an Italian scholar and poet, *b.* at Athens, though of German descent. He was one of the founders of the *Giornale Storico della Letteratura Italiana*, and is chiefly famous for his poetry. His poems are contained in *Versi*, 1874; *Poesie e Novelle*, 1876; *Medusa*, 1880 and 1890; *Dopo il Tramonto*, 1893; *Le Danaidi*, 1897; *Morgana*, 1901; and *Poemeti drammatici*, 1904; several of which have been set to music. His prose works include an important work on *Foscolo, Manzoni e Leopardi*, 1898. Died May 29.

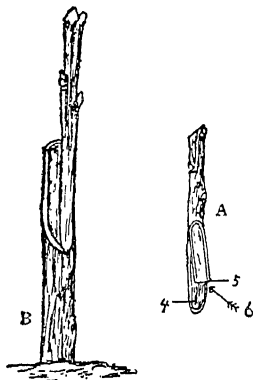
Grafty, Charles, American sculptor; *b.* Dec. 3, 1862, at Philadelphia; son of Charles G. Educated: Pennsylvania Academy of Fine Arts under Thos. Eakins; in Paris under Chapu and Dampet. Returned to Philadelphia. Works: portrait-busts; also life-size and colossal figures; ideal figures and groups—largely in bronze: *e.g.* 'Fountain of Man,' Buffalo Exposition, 1901; 'Symbol of Life' (small bronze); 'Mauvais Présage,' Detroit Museum; 'Vulture of War,' St. Louis Museum; 'England' and 'France,' New York Custom Ho.; Gen. Reynolds Smith Memorial, Philadelphia.

Grafting, a gardening process, founded on a natural and frequent

x

occurrence, whereby a budding sprig or branch of one tree is inserted into another, the object being to bring about perfect cohesion or unity between the two different plants. Gardeners graft for several reasons, first to multiply and quicken the fertility of a tree, especially of a fruit tree, and secondly to increase and preserve the numerous varieties and sub-varieties already obtained. G. is an old practice. Virgil has a good deal to say about it in his *Eclogues*, and like most old practices it can be done in a great number of ways. Thus horticulturists distinguish between side, crown, cleft, saddle, and root

Grafton: (1) A river port on both sides of the Clarence R., 342 m. N.E. of Sydney by sea, and connected by rail with Brisbane, etc., in Clarence co., New South Wales. Sea-going vessels of moderate burden can reach the city, which has an extensive shipping trade with Sydney. G. has both Anglican and Roman Catholic cathedrals, and is commercially important as the centre of a fertile agricultural country. Pop. 5500. (2) A township, connected by rail with New York, Hartford, Boston, etc., 6 m. S.E. by S. of Worcester, in Worcester co., Massachusetts, U.S.A. Pop. 7030. (3) A town with



WHIP OR TONGUE GRAFTING

- A. Scion prepared. 4. First cut. 5. Second cut. 6. Point of raising the tongue.
B. Scion inserted in stock cut with a tongue to receive it.



GRAFTING FRUIT TREES

Whip or tongue grafting. First cut. See also A, B, in accompanying figures.

G. and also veneering, in arching and in laying, etc., but tongue G. is the most popular mode. In this case the nurseryman takes a graft or scion, a budding shoot some six inches long, and cuts a thin elongated wedge upwards from the cut end. He then makes a similar narrow incision downwards in the stock, that is, the shrub or tree he wishes to graft, and proceeds to fit the tongue of the scion into this incision, binding the junction carefully with twine or bast-matting, and excluding air by means of clay or some prepared composition. This operation must be performed in the spring after the sap has begun to rise or in the autumn whilst the sap is still flowing. G. is commonly used to force young trees, as it frequently results in a prodigious increase in their fruitfulness.

machinery, foundry and glass works, on the Tygart, 100 m. by rail S.E. of Wheeling, in Taylor co., of which it is the capital, West Virginia, U.S.A. Coal mines are at hand. Pop. 7737.

Grafton, Augustus Henry Fitzroy, Duke of (1735-1811), a politician, was a descendant of Charles II. Educated at Westminster and Cambridge, he entered parliament in 1756, where, as Horace Walpole explains, he rose into prominence with an almost meteoric rapidity. His early promise, however, was hardly fulfilled and he is now chiefly remembered for his prudent insistence on the folly of retaining the tea and other duties levied on the American colonies in the face of so sturdy an opposition. First Lord of the Treasury in Chatham's ministry of 1766, he became Prime Minister in the following year as the result of his

leader's incapacity. But his conciliatory policy towards America was unpopular, and in 1770, after being the butt of Junius's thunders, he was glad to retire from his uncomfortable pedestal and to pursue at leisure his private 'amours' and distractions.

Grafton, Richard (d. 1572), chronicler and printer, collaborated with Whitchurch in 1537 to produce a modified version of Coverdale's Bible, and in the following year departed to Paris in the company of Coverdale to print a revised version of the same work. But the Inquisition pronounced the book a heresy, and G. was obliged precipitately to flee to England, where he completed his task in 1539. In 1544 G. and Whitchurch obtained the monopoly for printing church service books, and at Edward VI.'s accession G. became king's printer. A number of the works he printed, including a continuation of Hardyng's *Chronicle* (1543), and Hall's *Union of the Families of Lancastre and Yorke* (1548), have come down to us, and also some of his original and contemporary commentaries.

Graham, the name of an ancient and illustrious Scottish family. The 'gallant Gramahs,' as they are styled in the ballads, were Anglo-Normans who settled in Scotland during the twelfth century. 'The hardy wight and wise' Sir John de G. of Dundaff

conferred on William G. in 1504 as a recognition of his services at Sauchieburn (1483) and elsewhere, for all the Gs. of this period were great warriors. This William was one of the 'Flower of Flodden,' who fell with the king, his master. The great Montrose (see MONTROSE), who was the fifth earl and first marquis, was the grandson of a distinguished G. who had been Lord Chancellor (1599) and Viceroy of Scotland, whilst his own son was always called the 'Good Montrose,' because of his gentle and peace-loving nature. The fourth marquis (d. 1742), like his famous forbear, won numerous honours. An eager upholder of the Union, he was raised to a duke in 1707, and in George I.'s reign became Secretary of State (1717) and also Chancellor of Glasgow University, an office held by his equally distinguished grandson, the third duke (d. 1836). Among his 'splendid employments,' which were legion, were the office of Paymaster of the Forces, Master of the Horse, Lord Justice-General of Scotland, and of President of the Board of Trade. Throughout his public life he followed William Pitt. His son (d. 1874) was Postmaster-General, and his grandson, the fifth duke (d. 1925), served in the S. African War, and from 1890 was Lord Clerk Registrar of Scotland.

Graham, Sir Gerald (1831-99), a British general, entered the Royal Engineers in 1850. During the Crimean War his courage at the storming of the Redan won for him the Victoria Cross. In 1884, as commander in the eastern Sudan, he was victorious at El Teb and Tamai, and the following year defeated the Arabs at Hashin and Tamai.

Graham, John, Viscount Dundee, see DUNDEE, VISCOUNT.

Graham, Robert, afterwards Cunningham-Graham (d. c. 1797), a poet, the son of Nicholas Graham of Gartmore, was educated at Glasgow University. He went out to Jamaica and became receiver-general. In 1785 he was appointed rector of Glasgow University, and from 1794-96 was M.P. for Stirlingshire. He was a keen Liberal and was an adherent of the principles of the Fr. Revolution. G. is chiefly remembered for his poem *If Doughty Deeds my Lady please*.

Graham, Robert (1786-1845), a Scottish botanist; studied medicine at the Glasgow and Edinburgh Universities, and practised in the former town. As a doctor he had great faith in the efficacy of drugs, such as opium and calomel, but he made his name as a botanical enthusiast, and occupied from 1820 till his death the regius professorship of that science in his native metropolis. His descriptions



JAMES GRAHAM, MARQUIS OF MONTROSE

was a boon-companion of Wallace, and was slain in the battle of Falkirk (1298). King Bruce rewarded the loyalty of Sir David G. by granting him the estate of 'Auld Montrose' in exchange for Cardross, and it is from this estate that the title of Earl of Montrose was taken, a title first

of newly-discovered species appeared in the *Edinburgh New Philosophical Magazine*, etc., but it was in his supervision of the Edinburgh Botanic Garden that he made his influence most widely felt.

Graham, Stephen (b. 1884), English novelist and travel writer. Began career as a clerk in the Civil Service; strongly attracted to Russian literature, he went to Russia as a young man and lived in Little Russia and Moscow among students and peasants to study at first hand the conditions of life there. Also travelled over the Caucasus, the Urals, and the North of Russia and, later, tramped with emigrants to the farms of the New World. In the Great War he served as a private in the Scots Guards, and the sequel to this service was the much discussed novel *Private in the Guards* (1919), which purports to reflect the annihilating influence of military discipline. His other publications, which are based on his travels all over the world and are written in a markedly good literary style, include *A Vagabond in the Caucasus*; *Undiscovered Russia*; *With Poor Emigrants to America* (1914); *Children of the Slaves*, 1920; *London Nights*, 1925; *Gentle Art of Tramping*, 1927.

Graham, Thomas (1805-69), a Scottish chemist, led an exceptionally full and busy life, and yet found time to follow up a number of most valuable and original researches in his chosen science, chemistry. From 1837 to 1855 he was professor of chemistry at University College, London, having already held, for seven years, a similar post at the Andersonian Institution of Glasgow. The most exacting of his public appointments, however, was his mastership of the mint, which he accepted in 1855 and retained till his death. It was G. who discovered the famous law of the diffusion of gases, and it was he also who established the polybasic nature of phosphoric acid and the formation with alcohol of certain definite salts, which he called alcoates, and which he observed were analogous to water-salts or hydrates. G. further examined the diffusibility of liquids, dividing them into crystalloids and colloids; the properties of the water of crystallisation of salts, and the passage of gases through small apertures, platinum disks, palladium, and india-rubber partitions, etc. Honours fell thick and fast upon him; his fellowship of the Royal Society dates from 1836, and he was first president both of the London Chemical (1841) and Cavendish (1846) Societies.

Graham, Thomas, see LYNEDOCH, LORD.

Grahame-White, Claude British aviator, b. Aug. 21, 1879; was educated at Crondall House College and Bedford Grammar School. He was one of the first men in England to own a petrol-driven car; and, after touring in S. Africa, he established a motor-engineering business in Albemarle St. In 1910 he opened an aviation school at Pau, and in the same year he won the Gordon-Bennett trophy. Later in the same year he established his works and school of flying at the London Aerodrome, Hendon. Flight-commander, 1914. His company's premises and plant at Hendon were acquired by gov. in 1925. In addition to publications in magazines, etc., he wrote *The Aeroplane, Past, Present, and Future*, 1911; *The Aeroplane in War: Aviation*, 1912; *Learning to Fly*, 1914; *Aircraft in the Great War*, 1915; *Air Power*, 1917; *Our First Airways*, 1918; several air-books for boys.

Grahamston, a small tn. on the L.N.W. Railway. $\frac{1}{2}$ m. N. of Falkirk in Stirlingshire, Scotland. Pop. 9432.

Grahamstown: (1) The cap. of the dist. of Albany, 106 m. N.E. by rail of Port Elizabeth, on the railway to Kimberley, in the E. Prov. of Cape Colony. It stands 1750 ft. above sea-level in a healthy and pleasant situation, and was named after Colonel Graham, who, in 1812, defended the region from the Kaffir invasions. Rhodes University College represents an active intellectual life; there are several good schools and both Anglican and Rom. Catholic cathedrals. Ostrich farming has tended to supersede wool-growing as the staple industry, but the town is still an entrepôt for agricultural produce. Pop. 15,000. (2) G. or **Thames**, a gold-mining centre, 46 m. E.S.E. of Auckland, in Thames co., N. Island, New Zealand. Pop. 5700.

Graian Alps, a range of the Western Alps, forming a boundary between Piedmont and Savoy, reaching northward to the Col de la Seigne. The highest summit, Gran Paradiso (13,320 ft.), rises S. of Aosta in Italy.

Grail, Holy (probably from Low Lat. *gradalis*, *gradalus*, a kind of vase, or from Modern Lat. *crater*, *cratella*, a bowl), the vessel from which Christ ate or drank at the Last Supper and wherein the precious blood of the Saviour was received, on the day that He was put on rood and crucified, 'by Joseph of Arimathea, in whose family the sacred vessel was religiously preserved. According to legend the G. was taken by Joseph, or his descendants, to Great Britain. It possessed

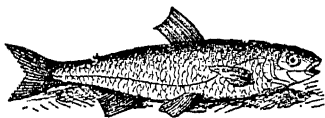
mystic properties, being able to multiply bread, to feed those who were free from sin, to strike blind by its effulgence all those who, not being pure, yet looked upon it, or to strike them with dumbness. The stories of the miracles which occurred in its presence and of its quest, after its mysterious disappearance, throughout Christendom, abound in the romances of chivalry of the Middle Ages. Most of them have their origin in the Anglo-Norman romances, oral or written, belonging to the Arthurian cycle. The G. first appears bound up with the story of *Perceval le Gallois*, or *Peredur*, as he is called in Welsh. Perceval had been brought up by his widowed mother in complete ignorance of chivalry, but by accident he sees some knights in armour, whereupon he becomes a knight-errant, and goes to the court of the Fisher King, the then guardian of the H. G. He sees the sacred vessel, but, failing to put some mysterious question, great trouble ensues, and the G. disappears: 'A great sorrow is befallen in the land of late through a young knight that was harboured in the hostel of the rich King Fisherman, for that the most Holy Graal appeared to him and the Lance whereof the point runneth of blood, yet never asked he to whom was served thereof nor whence it came, and for that he asked it not are all the lands commoved to war, nor no knight meeteth other in the forest, but he runneth upon him and slayeth him.' Later Galahad plays the most important part in its quest. He, Perceval, and Bors are the only knights to whom a vision of the G. was vouchsafed. The following are the sources of the G. legend: (1) The incomplete *Conte del Graal*, written by Chrétien de Troyes (d. c. 1195); (2) The *Parzival* of the Ger. Wolfram von Eschenbach (c. 1210), founded upon the former, and continuing it; (3) The trilogy *Joseph d'Arimathie*, *Merlin*, *Perceval* of the franc-contois poet, Robert de Boron, who attached the legend to the Breton cycle about the beginning of the thirteenth century; (4) the *Quête du Saint-Graal*, of unknown authorship, but attributed in a later form to Gautier Map; (5) the *Saint-Graal* (c. 1230), in prose founded on Boron's poems; (6) the *Mabinogi of Peredur*, a Welsh prose version of the fourteenth century, and (7) *Sir Perceval of Galles* (c. 1440), an English poem. The story began to be popular in England with the printing by Caxton in 1485 of Malory's *Morte d'Arthur*, founded on the *Quête du Saint-Graal*, and Tennyson, in the nineteenth century, created widespread enthusiasm for the romances of the Arthurian cycle

in his *Idylls of the King*. Wagner's *Parsifal* draws its inspiration from the same source. See Gaston Paris, *Littérature française au moyen-âge*; Weston, *Legend of Sir Perceval* (Grimm's Library, vol. xvii.); Newell, *King Arthur and the Round Table* (Boston), 1897; Birch-Hirschfeld, *Die Sage vom Graal*, and *The High History of the Holy Graal*, translated from *Perceval le Gallois* by Sebastian Evans (Everyman's Library).

Grain, the name of the smallest unit of weight both in England and the United States. The origin of the use of the word in this sense is supposed to be that it represents the weight of one G. of wheat. Regarding the G. as fractions of a pound, the avoirdupois G. = $\frac{1}{7000}$, and the troy G. = $\frac{1}{5760}$.

Grainger, George Percy (b. 1882), Australian pianist and composer, b. at Brighton, Victoria, July 8. Studied under Louis Pabst in Melbourne and J. Kwast in Germany, and, later, under Busoni. Became an intimate friend of Grieg in London in 1906, and later played Grieg's concerto at Leeds Festival at that composer's request. Toured in Europe, S. Africa and elsewhere, and performed in New York for the first time in 1915, since when he has been identified with American musical activities. As a composer and pianist G. introduced many of his own works at the principal concerts in London and in America, and also did much to spread the works of Debussy, Ravel, Albeniz (q.v.), and other modern composers. In the *Journal of the Folk-Song Society* (May 1908, No. 12) he published a collection of British folk-tunes which have become the bases of many of his compositions. Works: (orchestral) *Molly on the Shore*; *Shepherd's Hey*; *Irish Tune from County Derry*; *Hill Songs*; *Marching Song of Democracy*; *Sir Eglamore Brig Fair*; *Morning Song on the Jungle*; *Tiger, Tiger*. Consult *A Dictionary of Modern Music and Musicians*.

Graining, a species of dace thought by Gunther to be merely a local variety, but elevated by Pennant



GRAINING

and Yarrell into a distinct species called *Leuciscus luncastriensis*, because G. are found in the Mersey.

Gramineæ, a large order of plants containing grasses. It is a monocotyledonous order characterised by having leaves which are alternate and usually linear, with a long split sheath enclosing the stem; the nodes are prominent, the internodes long and hollow. The flowers, often unisexual, have no perianth, but are enclosed by bracts, termed paleæ, and are arranged in complicated inflorescences. Cereals are fruits of this family. Among the better known genera are *Saccharum*, the sugar-cane; *Zea mays*, the maize; *Oryza*, the rice; *Avena*, the oat; *Briaza*, the quaking grass; *Glycerium*, the pampas grass; *Triticum*, the wheat; *Hordeum*, the barley; *Bambusa*, the bamboo, etc. See GRASSES.

Grammar (Gk. γράμμα, letter; γράφειν, to write) treats of the usage of a word and of combinations of words in a language. It is an exposition of, or a treatise on, a language as it is customarily spoken among a particular people. Its function is to teach what is, not what ought to be, spoken. The first Gs. were written by the Sophists of ancient Greece, who studied the G. of their language primarily for the purpose of discovering the rules that govern the art of rhetoric. They first distinguished between the noun (ονομα) and the verb (ῥημα), which together form the basis of the G. of every language. Protagoras made a further advance upon the study of the language by marking the distinction between the three genders, masculine, feminine, and neuter, and between the various verbal moods. It was Aristotle who introduced the word πῶσις, case, using it to denote any flexion whatever. Later, the Stoics confined case to nouns. Thus the elements of G. were set forth and the parts of speech defined.

The second impetus given to the study of G. was due to the desire of studying a language unintelligible except with the aid of glosses and vocabularies. During the second century B.C. Alexandria was the great literary centre of Greece. In that town there flourished many scholars, but there was a great lack of any creative original talent. The Alexandrians, consequently, applied themselves to the study of the great poets of an earlier time. The Gk. language having changed in certain ways during the intervening centuries the language had to be studied in order that the poetry might be understood. Thus there grew up in Alexandria various schools of grammarians, who studied the language of ancient Greece. Among these were Zenodotus, a native of Ephesus, the superintendent of the great library, Alexander

the Ætolian, and Lycophron the Chalcidian, who were employed by Ptolemy Philadelphus about 200 B.C. to revise the Gk. poets. Later there were two distinct schools of grammarians, known as the Analogists and the Anomalists. The former was founded by Aristarchus of Samothrace (fl. c. 150 B.C.), a pupil of Aristophanes. This school upheld the law of analogy between the idea and the word, whereas the Anomalist denied the existence of rules except in so far as they were proved by custom and practice. Among the latter were numbered Crates of Mallus in Cilicia, who founded the famous school of G. at Pergamus. He published a commentary on Homer in opposition to the edition of Aristarchus. His was the first formal Gk. G. In the following century the Romans used the Gk. Gs. of the Alexandrians; then, in comparing their own language, Latin, with Gk., they came to write Latin Gs. The Latin G. books were modelled on that of Dionysius Thrax, an analogist. The Romans were obliged to modify and to enlarge upon existing definitions, to suit their own case. For example, a Latin noun has one more case than a Gk. noun, namely, the ablative case, which was first defined by Julius Cæsar in his *De Analogia*. The most famous grammarian of later Rome was Donatus, the teacher of St. Jerome. He lived in the fourth century A.D. His treatise on Latin G. has formed the basis of most books on that subject, from his own time up to the present day.

Formal grammar comprises morphology and syntax. Morphology treats of the forms of a language, the modifications of such forms, and the treatment of inflections, etc. In order to classify different branches of linguistic knowledge, definite nomenclature is indispensable, but has always been variable; Continental grammarians are continually proposing new sets of names for even the parts of speech. Most of the common names used in English G. books are derived through the Latin from the Gk., the Roman grammarians using, translating or mistranslating the Gk. names as they found them in Alexandrian G. books. Morphology deals with the various parts of speech, which, according to most English grammarians, are eight in number: noun or substantive, pronoun, adjective, verb or predicate, adverb, preposition, conjunction, and interjection; and with the classifications and inflections of these. Many grammarians do not recognise the interjection as belonging to the so-called

parts of speech, arguing that it can form no part of a sentence, and is nothing more than an articulated gesture. Morphology is closely related with etymology and phonology, for the classification and analysis of a word depends largely upon its stem and its form. It is also connected with accentuation and orthography in so far as the grammatical meaning of words is affected by a change of accent or of spelling, as, for example, in *incline* (noun) and *incline* (verb), and *practice* (noun) and *practise* (verb). Morphology treats of the form and structure of single words, whereas syntax treats of words in relation to other words, that is, of the arrangement of words into sentences according to the established usages of a language. Syntax is generally similar in languages belonging to the same family, though each has, of course, its own idioms. In an inflectional language like Latin less depends on the arrangement of words as their meaning is made clear by the inflectional endings. In an uninflectional language like English there must exist certain laws of position, which show the meaning of a word. For example, the word *sleep* might denote an action or a state, that is to say, it might be a verb or a noun; its meaning is made clear by its relation in a sentence to other words. English syntax is usually taught in schools by means of analysing and parsing. Analysis is the differentiation of types of sentences and the resolution of a sentence, whether 'simple' or 'compound,' into its component parts, whereas parsing is assigning each word in the sentence to its class as a part of speech and showing its syntactical relation towards other words in the sentence.

The rules of grammar depend upon the common practices of people, and, if these practices change, the rules become modified by the consent of the majority. The rules of modern English G. are very different from the rules of Old English G. By a continuous process of monophthongisation, English has ceased to be an inflectional language. But in order to understand fully the G. of modern English, the grammarian must study the change and development of Old English through Middle into Modern English. Moreover, a language has, in a sense, as many Gs. as it has dialects. Old English had various forms, West Saxon, Mercian, Kentish, Northumbrian, etc., the influence of the court of Alfred making West Saxon the chief literary form. In the Middle Ages the chief dialects were East Midland, West Midland, Northern, Kentish, and South-western.

Through the influence of the works of Chaucer, English, as now spoken and written by educated men, is a development of East Midland. This particular dialect of English has become prevalent among English-speaking people all over the world, and by English G. in common parlance we mean an exposition of that language as it is used by educated people. But, nevertheless, the dialects of Middle English still exist in a modified form among the more unsophisticated inhabitants of Scotland, Lancashire, Somersetshire, etc. The vocabulary, use of forms of speech, and construction of sentences differ in different counties. What is grammatical to an Irish peasant would be unintelligible to a Cornish fisherman. When G. treats of the different usages of a language in different places and at different periods of time, it is known as *historical G.* Historical G. can only be studied by consulting older records and inscriptions. The G. of a language can only be traced as far back as documentary evidence permits, and can only be continuous in a language where a succession of written records exists. The grammarian may, however, reconstruct one language by comparing its forms with those of cognate languages. Thus by comparing Old English with Gothic and Old High German, and these in turn with Latin and Gk., he would obtain some idea of the hypothetical forms of Primitive and Indo-Germanic, from which those languages are derived. This is known as the comparative method, and the system which regards one language in relation with other languages of the same family is known as *Comparative G.* The object of *Universal G.*, which has been called the 'metaphysics of language,' is, by comparing the Gs. of different families or groups of languages to arrive at some knowledge of the ideas that underlie all G.

Consult H. Sweet, *Words, Logic, and Grammar*, 1875-76, and *A New English Grammar, Logical and Historical* (2 vols.), 1892-98; E. Mätzner, *English Grammar*, trans. 1874; Sayce, *Introduction to the Science of Language*, 1879; T. G. Tucker, *Introduction to a Natural History of Language*, 1908; Schleicher, *Compendium of the Comparative Grammar of the Indo-European Languages*, trans. 1874; Pezzi, *Aryan Philology according to the Most Recent Researches*, trans. 1879; Delbrück, *Comparative Grammar of the Indo-Germanic Languages*, trans. 1888-95; Abel, *Ägypt-indo-eur Sprachverwandtschaft*, 1903; and Mauthner, *Beiträge zur Kritik der Sprache*, 1886-1900; Otto Jespersen, *Philosophy of Grammar*, 1924.

Gramme (from late Lat. from Gk. *gramma*, small weight), the standard unit of Fr. measures of weight, corresponding to 15·43258 grains troy. It is the thousandth part of the weight of a litre of distilled water at 0° C. The metric system includes centigrammes, decigrammes, decagrammes, hectogrammes, kilogrammes, and myriagrammes. Whilst the centigramme only represents 0·1543234 grain troy, the myriagramme represents 154323·4 grains troy, which is little short of one cwt.

Grammichele, a tn. in the prov. of Catania, Sicily, situated on the side of a hill. Beautiful marble is found in the neighbourhood. Pop. 14,400.

Gramont, Antoine Alfred Agénor, Duc de (1819–80), came of an illustrious family. Ambassador at Rome and Vienna, and, later, appointed Minister of Foreign Affairs in the Ollivier cabinet. His administration ended in disaster, and led to the Franco-Prussian War.

Gramophone, see TALKING MACHINES.

Grampians: (1) A mountain chain composed of granite, gneiss, quartzite, marble, and schists, which separates the Highlands from the

afford excellent pasturage. (2) Another range lies in Victoria, Australia, partly skirting the basin of the Glenelg and its tributary streams; the chief peak is the height of Mt. William.

Grampus (corruption of the Fr. *grand poisson*, Norman *grapois*, Sp. *gran pez*, It. *gran pesce*), an enormous fish which is to be found in the Northern Seas and off the coast of Greenland. It belongs to the Delphinidae or Dolphin family, and is the only cetacean which preys upon its own kind, the porpoise, dolphin, and whale. It is enormously strong and very voracious. Its special characteristics are the rounded head, conical teeth, and high dorsal fin. The adult G. measures from 20 to 30 ft. long, and is more than 10 ft. in girth. The upper part of the body is black, changing to white on the under surface and on part of the sides. It sometimes appears in herds numbering hundreds.

Gran, the cap. of the co. Gran, Hungary, and seat of the prince primate of Hungary. It is 25 m. N.N.W. of Budapest, on the R. Danube, and has a bridge of boats connecting it with the market town of Parkany. The cathedral, erected in 1870, is built after the plan of St. Peter's at Rome, and occupies a commanding position on the site of what was once a fortress. G. is one of the oldest towns in Hungary, and reputed for being the birthplace of St. Stephen. Mineral springs are to be found there. Pop. 18,000.

Granada: (1) An ancient Moorish kingdom of Spain, now comprising the three modern provinces of G., Almeria, and Malaga. It was the last Spanish territory to be freed from Moorish invasion under the leadership of Ferdinand and Isabella in 1492. The modern province embraces an area of nearly 5000 sq. m. It is bounded by Cordova, Jaen, and Albacete on the N., and S. by the Mediterranean Sea. It is overshadowed by the lofty mountains of the Sierra Nevada, and is watered by the Rs. Guadiana, Guadalquivir, and Rio Grande. The climate is very variable, being almost tropical in the valleys, whilst on the higher ground the temperature is freezing. It possesses a fertile soil, and there are valuable minerals and precious stones in the neighbourhood. There are valuable iron mines and manufacturing of all kinds, such as woollen, linen, cotton, soap, spirits, gunpowder, and sugar refining, which is the principal industry. The main Madrid-Malaga-Algeciras railway passes through the capital and there are several branch lines. Pop. 573,000. (2) The cap. of the kingdom of G. presents a curious mixture



[L.M.S. Ry. Photo

THE HEAD OF BEN NEVIS

Lowlands in Scotland. The highest well-known summits are Ben Nevis, Ben Macdhuì, Ben Alder, and Ben Lomond. The chief rivers flowing from the watershed N. are the Spey, Don, and Dee, with their tributaries, whilst those flowing S. are the Esk, Tay, and Forth, with their tributaries. The general aspect of these mountains is wild and rugged in the Highland district, but the Lowlands

of ancient and modern architecture, and lies at the foot of the Sierra Nevada and between two hills. The oldest portion of the town rests on the northern hill, Albaicin, whilst the main part of the town lies in the plain near the Genil. This portion of the city has a great number of buildings, principally churches, the cathedral, and a university. Some of its buildings are distinctly Oriental in character, such as the Alhambra Palace and castle of the Moorish kings. The cathedral is a Christian edifice containing the magnificent tombs of Ferdinand and Isabella, and of Philip I. and his wife. G. is derived from the word *granada*, pomegranate. Pop. 103,369. (3) A dept. and city in Nicaragua, Central America, covering an area of nearly 2600 sq. m. It lies between the Pacific and Lakes Nicaragua and Managua; although a huge plain, it contains the volcano of Masaya and the Mombacho Peak. It is the terminus of the Pacific railroad. The chief products are hides, sugar, cotton, indigo, coffee. Pop. about 15,000.

Granada, Louis de (1505-88), a celebrated Spanish preacher of humble extraction. His mother became widowed when he was only a child, and was assisted by the Dominicans. The boy received a good education, and after a period as page to the alcade, took vows at the Dominican Convent of Santa Cruz at Granada. He was later on appointed procurator at Granada, and then at the end of seven years he became prior of the Convent of Scala Caeli in Cordova. He acquired great fame as a preacher, and was ultimately appointed confessor and counsellor to Catherine, the queen-regent. He wrote two books, one on prayer and the other on the *Guia de Peccadores*, both of which enjoyed immense popularity. See Rousselot, *Les Mystiques Espagnoles*.

Granby, John Manners, Marquess of (1721-70), a distinguished British soldier. His father was the third Duke of Rutland. He entered parliament in 1741, but undertook military duties as well, taking part in the campaign of Flanders. He was appointed colonel of the Royal Horse Guards in 1758, and was present in the great action at Minden in the Seven Years' War. He was eventually appointed general of the British force in Ferdinand's army, where he gained great distinction. In 1766 he was appointed commander-in-chief, but he resigned his post at the end of three years owing to ill-health.

Gran Canaria, one of the chief Canary Is., is of volcanic origin; the name of its capital is Las Palmas. Area 65 sq. m. Pop. 130,000.

Gran Chaco (from Sp., 'great hunting ground'), a vast territory in the centre of S. America, occupying the territories of Eastern Bolivia, Western Paraguay, and part of the N. Argentine republic. It may be roughly divided into three districts, the Chaco Boreal, extending from the plains of Chiquitis to the Pilcomayo (bird river), and consisting of giant forests. The Chaco Central lies between the two rivers, the Pilcomayo and the Bermejo (red river). The third district, the Chaco Austral, lies between the Bermejo and Salado Rivers. The whole region is inundated at times to so great an extent that it presents the appearance of one vast lagoon. Indians are the chief inhabitants.



JOHN MANNERS, MARQUIS OF GRANBY

Grand Bahama, one of the principal islands of the Bahamas, W. Indies, in lat. 26° 41' N., and long 79° W. It is about 70 m. long, and 9 m. wide.

Grand Canal, The, one of the most important means of communication in China, as the roads are so defective; it is also called Yunho (transport), and extends from Hangchow to Tientsin, covering a distance of nearly 1000 m. This canal has existed for centuries, the first section, from the Yang-tse-kiang to the Hwei R., being opened nearly 500 years B.C. The section of the canal lying between Hangchow and Yang-tse-kiang was constructed early in the seventh century. In the eighteenth century it was found necessary to protect the canal from sudden inundations, and for this purpose a double series of lakes was formed on the western side of the canal to enable the surplus waters to discharge themselves and flood the land beyond.

The main body of the stream empties its waters into the Yang-tse-kiang.

Grand-Combe, La, a com. of France, in the dept. of Gard and the arron. of Alais. There are coal mines, glass works, and zinc mines. Pop. 11,300.

Grand Falls: (1) Cataracts of the Hamilton, or Grand R., in Labrador, situated about 250 m. from the mouth of the river. There are two falls, each having a clear drop of 300 ft. or more. (2) A city on Exploits R., Newfoundland, founded in 1905, and engaged in the manufacture of paper. Pop. about 4000.

Grand Forks, a city of N. Dakota, U.S.A., and cap. of Grand Forks co. It is situated on the west bank of the Red R., opposite the mouth of Red Lake R.; it is served by two railways, and is about 55 m. N. of Fargo. The surrounding district is a rich wheat valley, and a trade in wheat and flour is carried on. There are saw-mills, breweries, and iron-works. In 1922 the state built a large terminal elevator and flour mill here, and a sugar beet factory has also been erected here. On the borders of the city is the university of North Dakota, opened in 1884. A trading post of the N.W. Fur Company was established here in 1801, and permanent settlement began in 1871. The city was chartered in 1881. Pop. 17,112.

Grand Haven, a city of Michigan, U.S.A., and the cap. of Ottawa co. It is situated on Lake Michigan opposite Milwaukee, and 30 m. from the Grand Rapids. It is served by two railways, by lake steamers, and by motor-bus and trolley lines. In 1821 the American Fur Company established a trading post here, and permanent settlement began in 1834. The city was chartered in 1867. Pop. 8345.

Grand Island, a tn. of Nebraska, U.S.A., and the cap. of Hall co., situated on the Platte R., and served by three railways and an air service. It has an extensive trade in cattle and grain, and has a large beet-sugar manufacture, besides creameries, flour mills, marble works, etc. It possesses a college, established 1892, and the state Soldiers' and Sailors' Home is situated here. Settlement was begun in 1857 and the city was incorporated in 1873. Pop. 13,041.

Grand Junction, a city of Colorado, U.S.A., in Mesa co., of which it is the cap. It forms an important railway junction. In the neighbourhood gold, silver, and coal are mined. It is about 200 m. W.S.W. of Denver. It was settled in 1881 and incorporated in 1882. Pop. 10,247.

Grand Jury, see JURY.

Grand Manan, an island at the entrance of the Bay of Fundy in the

co. of Charlotte, New Brunswick. Well known as a health resort. Greatest length is 16 m., and greatest breadth 6 m. Pop. 2700.

Grand Pré, or Lower Horton: (1) A post. vil. in Nova Scotia, situated in King's co., 15 m. from Windsor. Stands in the midst of very fertile country. Has been made famous as the scene of Longfellow's poem *Evangeline*. Pop. 900. (2) A French tn. in the Ardennes.

Grand Rapids, a city of Michigan, U.S.A., situated in Kent co., of which it is the cap. It stands on the Grand R. It is served by five railways and by motor coach and truck lines. The city has been much improved since 1922: roads have been widened and viaducts built to accommodate the increasing traffic, and the hill portion of the city is being laid out as an attractive residential quarter. It has a junior college and special classes for backward children. It has been under commission-manager government since 1916. The chief industries are the lumber industry and the quarrying of gypsum. It manufactures paper, flour, hosiery, tobacco and furniture, the latter being the chief manufacture, though the manufacture of aeroplanes, etc., during the Great War has given rise to a variety of industries. It is the seat of both a Catholic and a Protestant bishop. Pop. 168,592.

Grand River, The: (1) Canada, rises in Grey co., flows S. and then S.E., entering Lake Erie after a course of 150 m. It can be used for navigation for 70 m. up, and communicates with Lake Ontario by the Welland Canal. (2) One of the head streams of the R. Colorado, U.S.A.; it rises in the Rocky Mts., and joins the Green in Utah, flowing through a very mountainous district. Length 348 miles. (3) Rises in the co. of Jackson in Michigan, U.S.A., and after flowing first in a westerly, then a northerly direction, directs its course once more westward, emptying its waters into Lake Michigan at Grand Haven. It is about 300 m. long. (4) Rises in Missouri, U.S.A. and eventually joins the Missouri at Brunswick. Length 300 m.

Grand, Sarah (Frances Elizabeth McFall), an English novelist, b. in 1862, in Ireland, of Eng. parents; daughter of Edward John Bellenden Clarke, Lieut. R.N. Married, at 16, Brig-Surgeon Lieut.-Col. McFall (d. 1898). She became famous through her first novel, *Idealia*, 1888. She has also written *The Heavenly Twins*, 1893; *The Beth Book*, 1897; *Babs the Impossible*, 1900; *Adam's Orchard*, 1912; *The Winged Victory* 1916; *Variety* (tales), 1922.

Grand Serjeanty. In the feudal system of land holding tenure by G. S., or *per magnum servitium*, meant that the vassal held his land on condition of rendering special services to the king instead of serving the king generally in time of war. The services were always free, but were uncertain in nature. Instances of such services were carrying the king's banner or lance when he went to war, filling the post of butler, champion (the officer whose duty it was to ride fully armed into Westminster Hall and challenge to single combat any one who should deny the king's title to the crown), or other officer at his coronation. In contradistinction to G. S. was the tenure by *petit serjeanty*, where the duties or services were of a somewhat servile nature. (See PETIT SERJEANTY.) A rather similar tenure was that by *cornage*, where the tenant's duty consisted in winding a horn to give men warning of the coming of the Scots or other enemies.

Grandville, the pseudonym of the celebrated caricaturist Jean Ignace Isidore Gérard (1803-47). He was b. at Nancy. Quite early in life a series of caricatures, which portrayed the woes of the small proprietor, gained him a certain amount of popularity. He was also well known as a book illustrator; he illustrated editions of *Gulliver's Travels*, *Don Quixote*, and *La Fontaine's Fables*. His political caricatures also came in for much praise. He d. in a lunatic asylum at the age of forty-four.

Granet, François Marius (1775-1849), Fr. painter, b. at Aix (Provence), son of a master builder. Learned painting in an art school directed by Constantin, a landscape painter. Became famous for Capuchin studies with striking effects of light. His masterpiece is 'Chœur des capucins de la place Barberine'; other pictures, 'Stella dans la prison du Capitole' and 'St. Louis délivrant des prisonniers français à Damiette.'

Grange, or **Grange-over-Sands**, a par. and vil. on Morecambe Bay, N. Lancashire, situated about 10 m. N.W. of Carnforth. A well-known watering place, especially popular among the inhabitants of Lancashire and Yorkshire. Pop. 2232.

Grangemouth, a seaport tn. in Scotland, in Stirlingshire, at the entrance of the Forth and Clyde Canal, about 3 m. N.E. of Falkirk. Coal is mined in the immediate vicinity. There are saw-mills and shipyards. The chief exports are pig-iron, iron ore, and timber. It has direct communication with the Continent. Docks (93 acres) were opened in 1905. Pop. 10,000.

Granger, James, Rev. (1723-76),

b. at Shaston, Dorset, and took orders. He became vicar of Shipplake, in Oxfordshire. He is remembered for the *Biographical History of England* which he published, and which went from the eighth to the end of the seventeenth century. The striking feature of this biographical history was the collection of portraits with which he illustrated his work. A continuation of his work appeared in 1806.

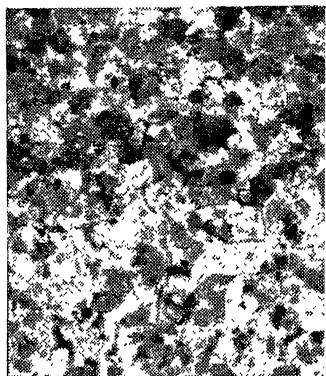
Grangers, the name given in U.S.A. to a farmers' trade union, founded in 1867 under the name of the National Grange of Patrons of Industry. It promoted the education of the farmer on the technical side, and advised co-operation in the sale of seeds, machinery, etc. It used its influence to agitate for the removal of railway monopolies. It was founded by a man named Kelley at Washington, D.C.

Granicus (Mod. Bigha Chai), a river in Asia Minor. Its source is in Mt. Ida, and it flows into the Sea of Marmora. Here Alexander the Great defeated the Persians in 334 B.C., and it was also the scene of the defeat of Mithridates in 73 B.C. by Lucullus.

Granier de Cassagnac, see CAS-SAGNAC.

Granite, a group name for several plutonic rocks which form the great bulk of the igneous rocks of all ages, and consist of a completely crystalline mixture usually of quartz, felspar, and muscovite. This last substance may be wholly or partly replaced by several other minerals, e.g. hornblende or biotite, or in rarer cases by augite. Accessory minerals are always found, the most common being apatite, garnet, zircon, or sphene, with varying quantities of plagioclase. Sections of G. show considerable diversity of detail, but usually it is found that the quartz is a colourless transparent allomorphic substance filling the interstitial spaces between the other crystals. The orthoclase, which is the general type of felspar present, will have a clearly marked outline, and is generally translucent, on account of more or less decomposition. The muscovite will show definite cleavage cracks, and in large crystal specimens separate flakes can be easily removed. The presence of biotite is generally indicated by glistening black particles which are readily flaked. In some specimens the crystals can only be distinguished under the microscope, and such are said to possess a *micro-granitic* structure. Although G. possesses at least three essential minerals, yet there are related rocks which possess two of the constituents. *Greisen* is composed of quartz and muscovite, while *aplite* is made up of quartz and

orthoclase. There is hardly any extensive region in the world in which granitic masses do not occur. To mention but a few sites: N.W. Portugal, S.W. Spain, between Dresden and Görlitz, in the Grampans of Scotland, the Lofodens off Norway, Corsica, Sardinia, S. chain of the Urals, S.E. across France from St. Malo towards Avignon, along the E. coast of Brazil, plateaus of S. Africa, etc. The great value of the rock is as a building material, and the fact that masses of the rock of great magnitude can be procured of perfect continuity is one of the many reasons for its popularity. For vast and massive structures intended to



GRANITE

The light mineral is orthoclase, and the very dark mineral is black mica. The intermediate or greyish mineral is quartz, which appears dark in the photograph by reason of its transparency

resist weather and violence most Gs. are admirably adapted, though in the case of those rich in potash felspar they are less valuable against weathering. The Egyptian obelisks consist of porphyries and syenitic Gs. The Aberdeen quarries yield massive blocks of stone of excellent quality, in which the chief felspar is albite (soda-felspar). The ultimate result of the disintegration of G. is to yield soils rich in plant food, and also to yield a long list of compounds of which the kaolin (china clay) of Dartmoor, etc., is specially noted. See Harris's *Granite and the Granite Industries*.

Granite City, a city of Madison co., Illinois, situated on the Mississippi, about 3 m. N.N.E. of St. Louis. It is served by six railways.

Iron and steel goods are manufactured here, also there are car factories, syrup plants, and many other small industries. The city was founded in 1893 and incorporated 1896. Pop. 25,130.

Gran Sasso d'Italia, a mountain group in the Apennines, reaches an elevation of 9585 ft. in Monte Corno, which is the highest point in the whole mountain chain.

Grant, in English law, a term which, in its widest sense, is a synonym for any transfer of property. In a narrower sense it is interchangeable with 'assurance,' as meaning a conveyance by deed of lands. In this sense it connoted not only such old forms of conveyance as feoffment, and bargains and sales, but also all such existing forms as leases, charges, and settlements. In this sense, too, it was contrasted with transfer by 'livery of seisin,' i.e. by delivery of possession; practically all real property is now conveyed by deed, but formerly corporeal hereditaments in possession were transferable by mere delivery of possession, whereas incorporeal hereditaments (reversions, remainders, advowsons, tithes, rights of way, franchises, annuities, rents, etc.), not being physically capable of delivery, were said to lie in G., i.e. they were transferred by deed. In relation to *personalty*, G. is used as opposed to *gift* (q.v.), which latter term implies a transfer without consideration (q.v.).

Grant, Albert (1830-99), b. at Dublin, being the son of V. Gottheimer of London; he was usually known as Baron Grant. His early attempts at company promoting were enormously successful, and in 1874 he purchased Leicester Square, which at that time was practically waste land. He had this land laid out properly and presented it to the Metropolitan Board of Works for the benefit of the public. He was twice member of parliament for Kidderminster. His later speculations were not fortunate, and he d. comparatively a poor man.

Grant, Sir Alexander (1826-84), a leading British educationist, b. in New York, and educated at Harrow and Oxford. He distinguished himself at the university, and from 1849-60 he was a fellow of Oriel. In 1857 he published a book, *Ethics*. He was an examiner for the Indian Civil Service, and in 1859 went to India, where he became a professor at Elphinstone, and later vice-chancellor of Bombay University and Director of Public Instruction for the Bombay Presidency. In 1868 he became principal of Edinburgh University. Here he remained until his death.

Grant, Sir Francis (1803-78), a Scottish portrait painter, *b.* at Edinburgh. He was educated at Harrow and Edinburgh University, and was intended for the Bar. He, however, almost immediately began his career as a painter, and at the age of twenty-one had already exhibited in the Academy. He became an R.A. in 1851, and fifteen years later became president of the Royal Academy and in the same year was knighted. Amongst the more famous of his portraits were: An equestrian portrait of the Queen and Prince Consort and portraits of the Marchioness of Waterford, Palmerston, Macaulay, and Russell.

Grant, James Augustus, Colonel (1827-92), *b.* at Nairn. He was educated at the Marischal College, Aberdeen, and entered the army. He saw service at Gujerat, and was actively employed during the Mutiny and the expedition to Abyssinia. He gained distinction for his services in both expeditions. Between the years 1860-3 he accompanied the explorer Speke in his expedition to the sources of the Nile. Amongst the works which he published were: *A Walk across Africa*, and *The Botany of the Speke and Grant Expeditions*.

Grant, Sir James Hope (1808-75), a British general. Brother to Sir Francis G. *b.* at Kilgraston, Perthshire, and entered the army. He was first on active service in China, and from here he went on to the Sikh wars, where he greatly distinguished himself. He was of great service during the Mutiny, taking part in the relief of Cawnpore and the retaking of Lucknow. After the Mutiny had been broken he commanded the army which finally settled in India. He also took part in the Chinese War which followed the Mutiny. From 1861 to 1865 he was commander-in-chief of the army in Madras. *See* Life by Knollys, 1894.

Grant, Sir Patrick (1804-95), a British field-marshal, *b.* at Auchterblair, Inverness-shire. Entered the Bengal native infantry as an ensign and became a captain in 1832. He rose fairly rapidly in the service, and was present at the battle of Maharajpur (1843), Moodkee (1845), and Sobraon (1846). In 1849 he saw still more active service, and was made A.D.C. to the queen. He served under Sir C. Napier in 1851, and from 1856-61 he was commander-in-chief of the Madras army. In 1857 he took over the command of all troops in India, and directed the operations against the mutineers until the arrival of Sir Colin Campbell. In 1861 he left India. He was governor of Malta (1867-72), made field-marshal (1883).

From 1874-95 he was governor of the Royal Hospital at Chelsea.

Grant, Robert (1814-92), an astronomer of some note, *b.* at Granttown, Morayshire, Scotland. He received the gold medal of the Royal Astronomical Society in 1856 for a work entitled *A History of Physical Astronomy*. In 1859 he became professor of astronomy in Glasgow University. He published, in 1883, *A Catalogue of 6415 Stars* and, nine years later, *A Second Catalogue of 2156 Stars*.

Grant, Ulysses Simpson (1822-85), an American general, and 18th president of the U.S.A. He was descended from a Scottish family which had settled in Massachusetts in the seventeenth century. He was *b.* in Clermont co., Ohio, and was brought up on a farm there. He was, however, sent to West Point to the Military Academy there, and entered the army of the U.S.A. In 1844 he went to Louisiana with his regiment, and later he served as a second lieutenant under General Taylor with the army in Texas. He was present at the battles of Palo Alto, Resaca de la Palma, and at the capture of Monterey. He was also with Scott in his Mexican campaign, being twice promoted for bravery. After this latter war he returned to the States, resigned his commission, and lived for some time on a farm near St. Louis, Missouri. On the outbreak of war in 1861 he offered his services to the Federals, and was appointed as a lieutenant-colonel to a Missouri infantry regiment. He soon, however, proved his ability as a soldier and was made a brigadier-general. He fought at the battle of Belmont, captured Fort Donelson on the Cumberland, and made a great attack in 1863 on Vicksburg, forcing the enemy to surrender, and took over 31,000 prisoners. He was then made major-general and placed in command of the division of the Tennessee and conquered Bragg at Chattanooga. In 1864 he was made lieutenant-general and given supreme command of the U.S.A. army. His campaign as commander-in-chief was the bloodiest of the war. The great battles of the Wilderness, Spottsylvania, Court-house, and Cold Harbor crippled the enemy, and finally the taking of Petersburg caused the evacuation of Richmond, the Southern capital. On April 9, 1865, Lee surrendered the whole of his army. This practically ended the war. In the next year G. was made general, and two years later was elected president. At the expiration of his term of office he was again elected. In 1880 his friends wanted to have him nominated for

a third term, but there was so much sentiment against this that the project was dropped. Probably the greatest event of his presidency was the peaceful settlement of the Alabama claims. When he retired from his presidency he accepted a position as a partner in a banking firm, which, however, in 1884 suspended payment, the two other partners having defrauded G. and absconded, ruining the ex-president. In the same year he commenced to write his autobiography to earn money for himself and his family. He died in the following year of cancer of the tongue. Before his death, however, he was restored to his rank of general, which he had to resign on becoming president. See *Personal Memoirs*. G. will always rank high among American military men, but he did not possess the genius of his chief opponent, Robert E. Lee. However, he was one of the first to pursue the attrition policy of which so much was heard in the Great War. G. realised that the North could fill the gaps in his armies, but that the South had exhausted all its available man-power.

Grantham, a municipal and parlor of Lincolnshire, England, situated on the R. Witham, and forms an important junction on the L. & N. E. Railway. The parish church of St. Wulfran is a most magnificent building, mainly in the Early English style. Two libraries of the sixteenth and seventeenth centuries are preserved in the church. There are many other old and interesting buildings of note. The main hotel of the town, the Angel, was originally a hostel of the fifteenth century, and its architecture preserves many traces of its antiquity. The chief industries of the town are the manufacture of implements for agricultural use and malting. It also has iron foundries. The town is mentioned in the Domesday Book, and was originally governed by the bailiff of the lord of the manor. A mayor and alderman were granted it early in the reign of Edward IV. From 1463 to 1885 Grantham returned two members to Parliament, but by the Redistribution Bill of the latter year the representation was reduced to one. The town has a famous grammar school, founded in 1528, of which the best-known pupil was Sir Isaac Newton. Pop. about 19,000.

Granton, a port of Edinburgh, Scotland, situated on the Firth of Forth, 2½ m. N.W. of Edinburgh, with timber yards, and printing ink and chemical works. G. was made a head port in 1860. It is served by the L.M.S. Railway and the L.N.E.R.

and is the headquarters of several steamboat lines. There is a large tobacco bonding warehouse. Pop. 2185.

Granulite, a name used by petrographers for two distinct classes of rocks. By French geologists it is regarded as synonymous with muscovite-biotitegranite. German petrologists give the term to a schistose metamorphic rock consisting essentially of small irregular crystals of quartz and orthoclase with minute pale red garnets; these last may be accompanied by kyanite, zircon, sillimanite, etc. The second use of the term is more common in England and America. Saxony is a typical region for Gs., which are here for the most part igneous; the 'moine gneisses' of N. Scotland related to these were originally sediments.

Granvella, Antoine Perrenot, Cardinal de (1517-86), b. at Besançon, his father being a lawyer, who afterwards became Chancellor of the Empire under Charles V. He studied law and divinity at Padua and Louvain, and at the age of about twenty-three became Bishop of Arras. He showed himself a past master of the art of diplomacy, and became, in 1550, Secretary of State. He helped to draw up the treaty of Passau (1552), and when the emperor abdicated he transferred his services to Philip II. He negotiated the marriage with Mary of England, and the treaty of Cateau-Cambrésis. He became archbishop in 1560, and cardinal in 1561. For a short time he was forced to withdraw from the Netherlands, but was called from his retirement to go on a mission to Rome, the result of his mission was the alliance which overthrew the Turks at Lepanto. He presided over Naples for some time, and had just been raised to the archbishopric of Besançon when he died.

Granville: (1) A port and watering-place of France in the dept. of La Manche. It is situated at the mouth of the Bosq, on the English Channel, and is fortified. The harbour is accessible to the largest vessels, and there is regular communication with the Channel Islands. Vegetables, fruit, fish, oysters, etc., are exported, and shipbuilding and the manuf. of brandy, cod-liver oil, etc., are carried on. Pop. 10,000. (2) A tn. of New South Wales, Australia, situated in Cumberland co., 12 m. W. of Sydney. It is an important railway junction and there are iron works, flour mills, tanneries and kerosene works. The chief manufactures are tweed, pipes, tiles and bricks and agricultural implements. Pop. 16,000.

Granville, George Leveson-Gower,

second Earl (1815-91), eldest son of the first earl, was educated at Eton and at Christ Church, Oxford, and in 1836 was returned to parliament as the Whig member for Morpeth. From 1841-46 he sat in the House of Commons as member for Lichfield. In the latter year he succeeded his father. He was now looked upon as a rising man of the Whig party and was made vice-president of the Board of Trade in 1848, and king's secretary in place of Palmerston in 1851. In 1856 he was elected chancellor of the University of London. Another question in which he showed great interest was the Women's Movement. He was invited to form a ministry in 1859, but was unable to do so, and served as president of the council in the administration of Lord Palmerston. In 1868 he was Colonial Secretary in the first administration of Gladstone, and was Foreign Secretary in the Liberal administrations from 1870-74 and from 1880-85. This was the most important side of his career, but the policy pursued by his party was colourless and often weak, and his career as Foreign Minister does not add much to his fame as a politician. In 1886 he retired from political life. As a politician and diplomat he had great influence, but his tenure of the Foreign Secretaryship gives him no marked place amongst the great statesmen of the time.

Granville (or Grenville), George, Viscount Lansdowne (1667-1735), Eng. poet and politician, *b.* in Cornwall. Wrote some verses eulogising James II. on his accession, but, after the revolution of 1689, he lived in retirement for some time, devoting himself to literature. His tragedy *Heroic Love* was acted with great success. This was followed by the dramatic poem, *The British Enchanters*. In Queen Anne's reign he secured a seat in Parliament and became secretary at war. Married a daughter of the Earl of Jersey and was raised to the peerage. In George I.'s reign he was sent to the Tower on suspicion of taking part in a plot against the Gov., but was released in 1717, and, later, went to France, where he lived for some years. He was said to have been a man of considerable and varied talents.

Granville, John Carteret, Earl of. See CARTERET.

Granville-Barker, Harley, English playwright and actor-manager, *b.* in 1877, in London; son of Albert James Barker. He made his first appearance on the stage in 1891. After playing many parts in the provinces and London he, in partnership with J. E. Vedrenne, became manager, in 1904, of the Court

Theatre, Sloane Square, London. Here, and later at the Savoy Theatre, he produced and acted in many new plays, including several by his master, Bernard Shaw. His earlier plays include: *The Marrying of Anne Leete*, 1901; *The Voysey Inheritance*, 1905, perhaps his greatest play; *Waste*, 1907, which was refused a licence for public performance; and *The Madras House*, 1910. In collaboration with Berte Thomas he wrote *The Weather Hen*, and he was part author with Laurence Housman of *Prunella*. He collaborated with the late Wm. Archer in a book on *A National Theatre*; and he published *The Exemplary Theatre* in 1922. As one of the pillars of the Stage Society he took an active part in the agitation which led to the modification of the dramatic censorship. His methods as a producer have given rise to considerable controversy. His later plays include: *The Secret Life*, 1923; and *His Majesty*, 1928. He has of late years made several adaptations of notable foreign plays.

Grao, or Villanueva del Grao, a maritime tn. of Spain, in the prov. and dist. of Valencia, situated on the Mediterranean, and is the port of Valencia; it has a fine beach, suitable for bathing. Pop. 6000.

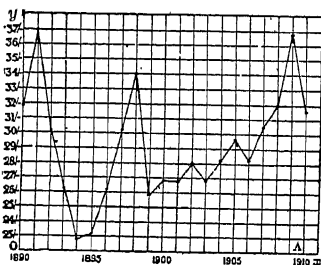
Grape, see VINE.

Grape-fruit, see SHADDOCK.

Graphic, The, an illustrated weekly newspaper, founded in 1869 as a journal of independent political principles, and appealing to popular taste by reason of its photographs, original drawings of topical interest, reproductions of masterpieces of painting and drawing, and excellent serials, which were illustrated by leading artists of the day. Hardy's *Tess of the d'Urbervilles* first appeared in the G., while George Meredith, Anthony Trollope, Charles Reade, Wilkie Collins, W. S. Gilbert, Lord Tennyson, Rudyard Kipling and J. M. Barrie were also contributors in their day. Richard Jefferies formerly provided a countryside diary. Some of its distinguished artists have been: Randolph Caldecott, who contributed Christmas pictures portraying hunting squires and hounds, stagey highwaymen, finely-executed sketches of life at Monte Carlo; Arthur Boyd Houghton, serial illustrator; J. E. Penwell, the water-colour painter; Sir Hubert von Herkomer, whose 'Chelsea Pensioners' originally appeared in the G.; E. J. Gregory; Sir Luke Fildes, whose Academy picture, 'Applicants for a Casual Ward,' appeared first as a wood-cut in the G.; W. L. Wyllie; Sir John Millais;

George du Maurier; and Phil May. In the 'seventies the G. sent out Josephine Butler as artist-correspondent; and among other distinguished war-artists the G. has shown the work of Frederic Villiers, Stanhope Forbes, and Sidney Hall; in April 1913 some striking impressionist pictures of the Balkan War by George Scott, pupil of Edouard Detaille, appeared under the title of 'Mud, Blood, and Silence.' Many of the greatest contributors were known during the editorship of W. L. Thomas. Some of the famous later-day artists are Frank Brangwyn, George Clausen, Seymour Lucas, Solomon J. Solomon, Melton Fisher, Reginald Cleaver, E. T. Reed, and Lewis Baumer. In 1926 the G. was purchased by the Inveresk Paper Co. Ltd., the resulting company being called Illustrated Newspapers Ltd. The Diamond Jubilee of the G. was celebrated by a special number on Dec. 13, 1929. The G. retains its high standard of work to-day, with topical articles and pictures, drawings, photographs, and short verse. Published at 346 Strand, W.C. 2.

Graphical Methods of Representation, as the name implies, are methods by which varying values or estimates are placed side by side, so that their changes and fluctuations may be readily seen. Suppose, for example, we are considering the yearly average price of wheat per quarter for the past twenty years. Take for convenience a piece of squared paper



and draw two lines Ox and Oy at right angles to each other. Let each point of division along Ox represent one year, beginning with 1890 at O to 1910 at A . Then taking any convenient length as a standard, measure off along Oy and the successive perpendiculars to Ox lengths representing the average prices for each year in turn. By joining up the points so obtained the yearly change may be followed much more readily than

from any table of figures. In a similar way the changes in any series of values taken at intervals may be graphically represented; and the method is particularly convenient in the case of economic, political, and meteorological statistics, where returns are made at regular intervals and comparison with previous returns are most important. So long as we are considering estimates for which there is one definite value for each year, the graph is obviously a complete record of fluctuations; but where we have a value which changes from day to day, for which observations are only made at longer intervals, the graph made up of a series of short straight lines is no indication of values at any time during an interval. In cases where it is practicable, where, in fact, the values do not fluctuate too abruptly, we can obtain a fair estimate of values for intermediate positions by joining the points by as smooth and continuous a curve as is possible (see INTERPOLATION). The most complete form of graphical representation is obtained in the barograph, which traces out mechanically, in one line on specially ruled paper, every slight variation in the height of the barometer throughout the day. A drum covered with ruled paper is made to revolve regularly by means of clockwork, while a pencil rising and falling with changes of atmospheric pressure traces out a continuous line.

Graphic Statics deals with the determination of stresses, tensions, etc., of frameworks and systems in equilibrium, by geometrical methods of construction. A force is completely determined when its magnitude, direction, sense, and point of application are known. It may, therefore, be represented by a straight line of definite length, drawn in a given

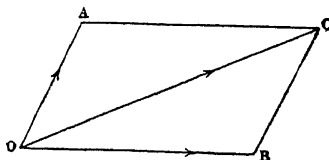


FIG. 1

direction through a point with an arrow head to determine the sense. This line is called the **vector**. It is proved that the resultant of two forces acting on a particle may be found by representing the forces by two straight lines OA , OB (Fig. 1), drawn through a point O , and by

completing the parallelogram OACB. Then the diagonal OC represents the resultant in magnitude and direction. It is evident that the three sides of the triangle OBC represent the three forces in magnitude and direction, though BC does not represent the point of application. Thus, if we are not concerned with the point of application, the proposition (known as the *Triangle of Forces*) may be

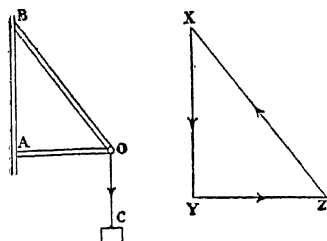


FIG. 2

stated thus: If two forces acting at a point are represented in direction, magnitude, and sense by two sides of a triangle OB, BC, then the third side OC similarly represents the resultant. Further, the three forces OB, BC, and CO, if acting at a point are in equilibrium. This may be extended to the *Polygon of Forces* which states that the resultant of forces represented by the lines AB, BC, CD, DE...HK

parallel to BO and AO. Measure YZ and ZX and find the weights their lengths represent, and hence are found the pull which BO exerts on the pin O, i.e. the tension in BO, and the force of compression in AO.

To determine the magnitude and the line of action of the resultant of any number of forces of given magnitudes acting on a body in given straight lines. Let p, q, r, s, t be the lines of action (Fig. 3) of the given forces. Draw the vector AB to scale to represent the force along p . Similarly, draw BC, CD, etc., parallel to q, r , etc., and proportional to the forces along them. Join AF and take any point O called the pole. Join OA, OB, etc. On p take any point P, draw PV parallel to AO, PQ parallel to BO, cutting q in Q. Through Q draw QR parallel to CO, and so on, finally drawing TV parallel to OF. Then the straight line through V, parallel and equal to AF, completely determines the resultant. This may be proved from the polygon of forces. The two figures are known as the *link or funicular polygon* and the *vector polygon* respectively. When the vector polygon is closed, the forces are either in equilibrium or are equivalent to a couple. When the link and vector polygons are both closed the forces are in equilibrium. To find the stresses in the bars of a roof truss of the shape shown in Fig. 4, where the joints M, N, and P are loaded, and to determine the reactions at the supports

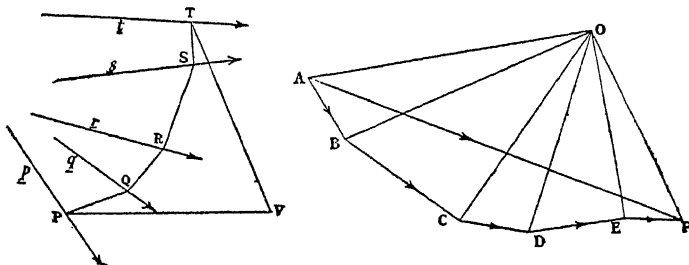


FIG. 3

taken in order is represented by the line AK which closes the polygon. Consider first the simple case of a load supported by a simple wall crane consisting of two bars, considered weightless (Fig. 2). The pin at O is kept in equilibrium by three forces acting along OA, OB, and OC. Draw the load line XY, vertically, to some given scale, say 1 in. to 1 ton. Through X and Y draw lines XZ and YZ

L and Q. Here the vector polygon becomes a straight line called the line of loads. Draw the load line AD, AB, BC, and CD, being respectively proportional to the loads at M, N, and P. Take any pole X and join XA, XB, XC, XD. Take any point T on the vertical through L, and draw TU, UV, etc., successively parallel to XA, XB, etc., and join TY. Through X

draw XO parallel to TY. Then OA and DO represent the reactions at the supports L and Q. For the stress diagram, consider first the forces at L; OA represents the vertical force. Through O and A draw lines OE and AE parallel to LR and LM respectively. Then EO and AE

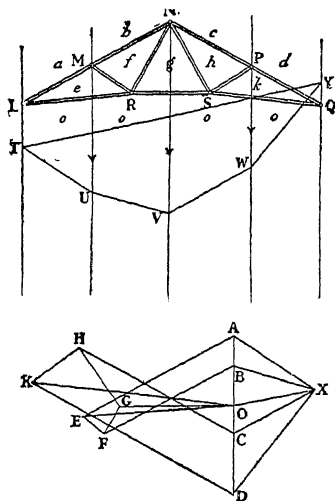


FIG. 4

measured according to the scale will give the stresses in LR and LM. The former is in tension and the latter in compression. Consider now the point Q. In a similar way ODK is the stress diagram and OK and KD measure the stresses in QS and QP. It is now possible to consider the points M and P. At M we know already the vertical force and the stress in LM. They are represented in the stress diagram by AB and EA. Through B and E draw BF and EF parallel to MN and MR. Then BF and FE represent the stresses in MN and MR. Similarly, KH and HC give the stresses in SP and PN. For the point N draw HG and FG parallel to NS and NR. Finally, by joining GO, which is parallel to RS, the stress in RS is measured and hence all the stresses are found. It is convenient to denote the spaces on the figure by small letters, which correspond to the capitals in the stress diagram. Thus, AE in the stress diagram represents the stress in LM between the spaces *a* and *e*.

The shearing force (S.F.) and the

bending moment (B.M.) at any section of a beam or bridge are defined as being the sum and the sum of the moments respectively of all the external forces perpendicular to it. To draw the S.F. and B.M. diagrams for the case of a beam or bridge loaded with a given weight at one point. The method here given will hold equally well for any number of loads. Let PQ (Fig. 5) represent the bridge drawn to scale, and R the position of the given load. Draw the load line AB for the vector polygon. Let X be the pole at a definite distance from AB. Construct the link polygon CDE, closing it by joining CE. Through X draw XO parallel to CE, thus determining the reactions at the ends. Through any point L on PQ draw a vertical line LMN, cutting the link polygon in M and N. Measure MN and multiply it by the number of units distance of the pole X from AB. Then this product represents the B.M. at X. Thus, the B.M. at any point may be found. To determine the S.F. draw any horizontal line HK to intersect the verticals PC and QE at H and K. From K measure off KS downwards along QE equal to OB, and from H measure off HW upwards along CP equal to OA. Through S and W draw ST and WY to meet RD in Y and T. Then the S.F. at L is measured by the vertical line L'Z, and similarly the S.F. at any point is measured by its vertical distance between HK

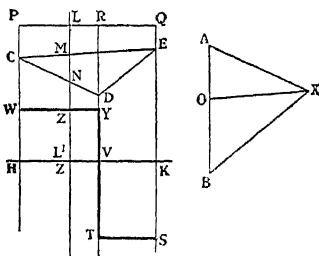


FIG. 5

and the line WYTS, thickened in the figure. When there are a number of loads this line moves upwards in a series of steps and the method is identical with the present one. For a further discussion on the subject, see G. C. Turner's *Graphics Applied to Arithmetic Mensuration and Statics*.

Graphite, see BLACK-LEAD.

Grapsus (Gk. γράψαλος, a crab), the name of a genus of crustaceans belonging to the family Grapsidae; they are marine crabs and are very

numerous on the shores of the Mediterranean. Frequently they are found on exposed rocks, over which they travel at a very rapid pace.

Graptolites, a group of fossil remains of extinct marine animals which floated about hanging to the underside of sea-weeds, or in some cases were anchored to the seabottom. They are usually found in great abundance in the Palæozoic rocks extending from the Cambrian to the Carboniferous.

Gras, Félix (1844-1901), a Provençal writer, b. at Malemort in the dept. of Vaucluse. He made a distinguished appearance as author in 1876 by publishing a work called *Li Carboundé*. An epic dealing with the topic of Simon de Montfort and the Albigenians appeared in 1882, and five years later he published his celebrated collection of Provençal ballads, *Lou Roumançero Provençal*. In 1891 he published a series of stories dealing with the Hungarian popes under the title of *Li Papalino*. His three great novels on the revolutionary period have been translated into English by C. A. Janvier—*The Reds of the Midi*, *The Terror*, and *The White Terror*.

Graslitz, a tn. of Bohemia, Austria, situated near the Saxon frontier, and 32 m. N.E. of Eger. The manufs. are musical instruments, articles made of mother-of-pearl, and embroidery. Pop. 10,000.

Grasmere, a small lake situated in Westmorland. It lies 4 m. N.W. of Ambleside, between Thirlmere and Windermere. It drains through to Windermere by the Rothay. Its length is about a mile. To the N. of the lake the village of G. lies. The church of this village has been made famous by the description of it given by Wordsworth in the *Excursion*. The poet himself lived much in the immediate vicinity, and lies buried, together with his daughter and sister, in the churchyard there. Pop. 876.

Grasse, a tn. of France in the Alpes-Maritimes dept., about 20 m. S.W. of Nice. It stands well over 1000 ft. above sea-level, and is situated in such a way as to be sheltered from the cold winds of the N. and open to the S. The vegetation produced is typical of Southern Europe, and many acres of land are devoted to the cultivation of flowers. The town is the centre of the manuf. of perfumes. Pop. 12,241.

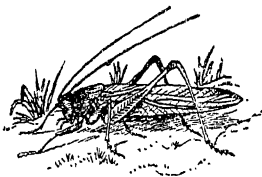
Gräse, Johann Georg Theodor (1814-85), a Ger. historian, b. at Grimma, Saxony. He was the royal librarian and head of the museum of porcelain at Dresden for the greater part of his life. He retired in 1882. The greatest of his works was: *Lehrbuch einer allgemeinen Litterärge-*

schichte aller bekannten Völker der Welt, 1837-60. He translated *Gesta Romanorum*, 1842; and wrote *Beiträge zur Litteratur und Sage des Mittelalters*, 1850; *Handbuch der alten Numismatik*, 1853.

Grasses (natural order Graminaceæ). These form one of the largest orders in the vegetable kingdom, and some of its members are of great service to man. They are evergreen, annual or perennial herbs, though bamboos sometimes reach a height of 100 ft. All G. either flower on a spike upon the same model as wheat, or upon a panicle such as oats; some are awned or bearded like barley. Each spikelet, whatever the inflorescence, consists of one to five flowers arranged alternately on a short axis, and beneath the lowest flower there are usually two (or more) empty bracts known as glumes. Each flower is sessile in the axil of a bract termed the outer palea or flowering glume, and there is an inner palea, opposite to, and higher than, the outer one; these two paleæ completely enclose the flower. In some species both stamens, usually one to three in number, and pistil are in the same flower, but more commonly the flowers are unisexual. The stem is generally characterised by swollen or tumid nodes to which the sheathing leaf-bases contribute; the long internodes are hollow, and a membranous ligule is developed at the junction of leaf-base and lamina. The ovary is one-chambered and one-ovuled, and the fruit or grain, technically known as a caryopsis, is entirely filled by the seed. G. are abundant on land, and a few species inhabit fresh water, but there are no marine forms. In the tropics they acquire a much greater height than in colder regions, but those species of a 'social' habit, constituting turf, are found only in temperate regions. The cereal G., wheat, oats, barley, rye, maize, rice, and various millets, cultivated for the sake of their grain, are the most valuable members of the order to mankind. Among the most esteemed fodder G. are rye G. (*Lolium perenne*); cock's-foot G.; timothy G. (*Phleum pratense*); the sweet-scented vernal G., which gives much of its fragrance to new-mown hay; and various species of *Poa* and *Festuca*. The tussack G. (*Dactylis cæspitosa*) of the Falklands is also much liked by cattle. Sugar is extracted from the stems of the sugar cane, *Saccharum officinarum*, a native of South-eastern Asia, but now cultivated throughout the tropics; and to a smaller extent from those of the guinea corn, *Sorghum saccharatum*. Other useful products of the family

are bamboo; a valuable material for paper making, obtained from esparto G. (*Macrochloa tenacissima*); aromatic 'G. oils,' such as verbenä, citronella, and geranium or ginger G., much used in perfumery.

Grasshoppers, insects belonging to the families Locustidæ and Acrididæ, which have very long hind legs with strong thighs, enabling them to jump great distances. The Locustidæ or green G. have very long antennæ, four-jointed tarsi or feet, a long ovipositor, and the stridatory organ in the wings; while the Acrididæ (to which family the 'locusts,' the true G., belong) have short antennæ, no ovipositor, feet with three joints, and the stridatory organ in between the



GRASSHOPPER

hind leg and the wing. These insects inhabit woods, thickets, and fields, and feed on vegetables and plants, but some eat flies and caterpillars as well. They generally fly about in the twilight, and being of a green or brown colour can easily hide themselves among the foliage. They lay their eggs either in the earth or in a dry stem; these hatch in spring and produce the young G., which moult six times before they become full grown. The 'chirp' is produced by the friction of the hind legs against portions of the wings or wing-covers in the Acrididæ, but in the Locustidæ by scraping one wing against the other. The common British type is the *Locusta viridissima*, which has a body about an inch long, but the *Decticus verrucivorus* (so called because the Swedish peasants use it to cure their warts) is also found.

Grass Lands. Agricultural areas may be roughly divided under three headings: Permanent Pasturage, Rough Grazing Lands, and Arable Lands. In England and Wales 15½ million acs. are devoted to pasturage, 3½ million acs. to rough grazing, and about 9½ million acs. are arable lands. In Ireland out of a total area of 17 million acs., 12 million are devoted to crops and pasture, while 2 million acs. are mountain grazing land. In Scotland nearly half the complete area of the land, 19 million acs., consists of rough

grazing land suitable for the most part for sheep-rearing. Arable land—that is, land suitable for raising crops and ploughing—are also grass lands at frequent intervals. These are determined by the method adopted for the rotation of crops. In England and Wales one year in each series of four, or two years in each series of five, would be devoted to grass, but in Ireland the method is frequently five years crops and roots, followed by three years grass. During recent years much attention has been given to the problems of permanent pasturage in order to prevent the deterioration of land. Careful scientific research has followed three lines of inquiry: (1) The best artificial means of enriching the soil; (2) the swiftest and most precise way of determining what kind of grass should be grown; and (3) the most economic periods of alternation of grass and crops.

Grassmann, Hermann Gunther (1809-77), mathematician and Sanskrit scholar, b. at Stettin. He studied philosophy, theology, and mathematics at Berlin, and succeeded his father as professor of mathematics at the Gymnasium at Stettin. In 1844 he published his mathematical work, *Die Wissenschaft der extensiven Größen oder die Ausdehnungslehre*, which did not at first meet with a favourable reception. At the age of fifty-three he began his study of Sanskrit, and made a great reputation. He published on this subject *Wörterbuch zum Rig-Veda* and a translation of *Rig-Veda*. Among his other scientific works are: *New Theory of Electro-dynamics*, *Theory of the Mixture of Colours*, and treatises on arithmetic and trigonometry. He enunciated, in 1863, the linguistic law which bears his name.

Grass-moth, a small moth, allied to the clothes-moth, which inhabits pastures. It is generally brown in colour, and long and narrow in shape, with a pointed head.

Grass of Parnassus, or *Parnassia palustris*, a species of Saxifragaceæ, which is found in damp places of Britain. The flower consists of five sepals, petals and stamens, and there are also five staminodes; the petals are white, and the plant is of graceful appearance. It is fabled to have appeared first on Mt. Parnassus, hence its name.

Grass Oil, a name under which several volatile oils derived from widely different plants are grouped. Ginger G. O. derived from the Indian plant *Andropogon nardus*, and geranium oil from *Pelargonium radula*, are very similar in properties, and are used for adulterating oil of roses.

Turkish G. O. and lemon G. O. or citronella oil are both obtained from India; the latter has an odour resembling citron, and is largely used for scenting soap.

Grass Snake (*Tropidonotus natrix*), a ringed snake found in England and in all the countries of Europe except Scotland and Ireland. It is of a brownish colour and differs from the common viper or adder in that it has not the zigzag black line down its back. There are two yellow or white spots behind its head which make it easy to recognise. The usual length is 3ft. or a little over; it rarely reaches 4ft. The snake hisses and strikes out with its head when attacked, but does not bite. It inhabits moist places, and feeds chiefly on frogs, toads, and fishes. It lays its eggs (which resemble a dove's in size and shape) in mould or under damp leaves. These vary in number and are glued together.

Grass-tree and Black-boy, names given to a liliaceous plant found in Australia, and called technically *Xanthorrhoea hastilis*.

Grass Valley, a tn. in Nevada co., California. U.S.A., 55 m. N.E. of Sacramento. It is served by the Nevada County Narrow Gauge Railway, which connects with the Southern Pacific. It is noted for its gold mines, and is a growing health resort. Pop. 4000.

Gratian, or Gratianus, was b. at Chiusi in Tuscany at the beginning of the twelfth century. The greater part of his life was spent in the monastery at Bologna, but he also taught in the university. He is famous as the founder of the science of canon law, and for his book, *Concordia discordantium canonum* or *Decretum Gratiani*.

Gratianus, Augustus (A.D. 359-383), Rom. emperor, son of Valentinian and Severa, b. at Sirmium in Pannonia. In 366 he was made consul, and the following year received the title of Augustus. On the death of his father in 375, the troops proclaimed Valentinian II., his half-brother, emperor. G. divided the provinces, but the real authority remained in his hands. In 378 he defeated the Lentienses at Argentaria, and in 379, with the help of Theodosius, drove the barbarians out of the Balkans. The first years of his rule were marked by energy and success, but later in life he became indolent and pleasure-seeking. This aroused the contempt of the Itom. troops, and they elected Maximus, who was then in Britain, as emperor. He at once crossed to Gaul and defeated G. near Paris. G. fled to Italy but was overtaken near Lyons and killed.

Grattan, Henry (1746-1820), an

Irish statesman and the greatest of Irish orators, b. in Dublin. He was educated at Trinity College, Dublin, and gave himself up to the study of the classics, especially the great orators of antiquity. At the age of twenty-one he entered the Middle Temple, London, but took little interest in his law studies, availing himself of every opportunity to listen to debates in the House of Commons. In 1772 he was called to the Irish Bar, and in 1775 entered the Irish parliament as member for the borough of Charlemont. The nation was then suffering from the loss of markets that followed the war with America, and from the restrictions upon trade which dated back to William III.; G. championed the cause of Irish independence and in 1779 got a total repeal of all the restriction Acts. His next step was to move a declaration for the independence of the Irish parliament; it was granted, and his countrymen voted him £50,000. This independence, however, was only nominal without reform, and for this G. pressed. He was also in favour of Catholic emancipation, and in 1785 supported Pitt's commercial propositions for establishing free trade between Great Britain and Ireland. In 1792 he succeeded in carrying an Act conferring the franchise on the Rom. Catholics, and in 1794 introduced a Reform Bill; but his mild measures promoted more extreme opinions, the country drifted into rebellion, and G. retired from parliament in 1797. He, however, returned to take his seat for Wicklow in the last session of the Irish parliament and fought the Union Bill. He was member for Malton, Yorkshire, in 1805 and for Dublin in 1806. His last years were devoted to the cause of Catholic emancipation, but, though supported by Canning and other statesmen, did not live to see his triumph. He was buried in Westminster Abbey beside Fox. G. was famous for his remarkable eloquence and incorruptible patriotism.

Grätz, a tn. in Prussia about 26 m. W. of Posen. Pop. about 6000.

Grätz, in Austria, see GRAZ.

Graubünden, see GRISONS.

Graudenz, or Grudziąz, a Polish tn. in the prov. of Pomorz, near the Prussian frontier, situated on the r. b. of the Vistula, 18 m. S.S.W. of Marienwerder. It has communication by boat with Dantzig, and many manufactures. The fortress was built by Frederick the Great in 1772-76, and was a little to the N. of Graudenz. The remains are now used as barracks and prison. It was seized by Prussia in 1772, but has now been restored to Poland. Pop. 33,000.

Graun, Carl Heinrich (1701-59), a Ger. musical composer, *b.* at Wahrenbrück in Saxony. He studied under Johann Schmidt, and at an early age composed a number of sacred cantatas. He always had a beautiful voice, and when a boy was in the choir at Dresden, but later, when his voice changed to a tenor, made his début at the opera of Brunswick. He rewrote much of the music he had to sing and was commissioned to write an opera for the next season. This piece, *Polydorus*, made him famous throughout Germany, and he was engaged by Frederick the Great for his private chapel at Rheinsberg. He composed twenty-eight operas, of which *Merope* is the best, as well as cantatas and pieces for the church service; his oratorio, *The Death of Jesus*, is perhaps his greatest achievement.

Gravel, a collection of small stones formed by the action of water upon rock, which is found in rivers and on the seashore. It varies much in character and appearance; when the fragments are small the deposit is sand, when large it is called shingle. It consists of pieces from all kinds of rock, but pebbles of quartz and quartzite are most common. When first deposited the G. is loose, but after a time it forms a hard rock known as 'puddingstone.' There are various kinds, the best being the 'Kensington,' a pit G. consisting of large quantities of oxide of iron which makes it binding (a quality essential for a good G.), and gives it a rich colour. Other kinds are the 'Dorset Pea,' composed of flinty pebbles about the size of a pea; the 'Lymington,' a flint G. which comes from Hampshire; the 'Sussex Pea,' and 'Sussex Bean,' and the 'Shell G.,' found on the coasts of the Channel Is.

Gravelines, a port and tn. of France, in the dept. of Nord and the arron. of Dunkirk. It is situated about 11½ m. S.W. of Dunkirk, and 48 m. N.W. of Lille. The harbour is 75 acs. in extent, with a depth of 16 and 18 ft. The cod and herring fisheries are important, and an export trade with England is carried on in fruit, vegetables, eggs, and fish. Other industries are paper, sugar, fish curing, and vegetable preserving. Pop. 5000.

Gravelotte, a tn. in Alsace-Lorraine, France, about 6½ m. W. of Metz. A famous battle was fought in the neighbourhood of this town in 1870, in the Franco-German War, resulting in the defeat of the Fr. under Marshal Bazaine. Pop. about 2500.

Graves, Clotilda Inez Marv. British journalist, novelist, and playwright; *b.* June 3, 1863, at Barracks, Buttevant, co. Cork; third daughter of

Major W. H. Graves. Among her plays are the Drury Lane pantomime *Puss in Boots*, and *The Bond of Union*, 1906. Her best known novel is *The Dop Doctor*, written under the pseudonym of Richard Dehan. Other works:—*Between Two Thieves*, 1912; *The Headquarter Recruit*, 1913; *The Man of Iron*, 1914; *Earth to Earth*, 1916; *A Sailor's Home*, 1919; *The Just Steward*, 1922; *The Lovers of the Market Place*, 1928.

Graves, Richard (1715-1804), a poet and novelist, *b.* in Gloucestershire. Some of his poems appeared in the collections of Dodsley and Pearch. He, however, attained greater popularity by his novels, all of which are now forgotten except the *Spiritual Quixote*.

Graves, Robert R. (*b.* 1895), Brit. poet. Son of Alfred Perceval G., a well-known figure in the Irish literary movement. Served with the Welch Fusiliers on the Western Front in the Great War, when he became known in England as one of three friends and poets, the others being Siegfried Sassoon and Robert Nichols. Appointed Professor of Eng. Literature, Egyptian University, in 1926. His poems have been classified into war, amatory, metaphysical, and poems of unrest; they are generally simple in expression. In those on nursery rhymes and fairy tales, the old and new are happily interwoven. The war poems present a mood of satiric desolation. Traditional themes, in poems like *In the Wilderness* and *The Avengers*, are invested with a rare pathos and lucidity. His poetry includes *Over the Brazier*, 1916; *Fairies and Fusiliers*, 1917; *Country Sentiment*, 1920; *The Pier Glass*, 1921; *The Feather Bed*, 1923; and *Welchman's Hose*, 1925. *Collected Poems* (1914-27), published in 1927. His prose work is mainly critical.

Graves, Soldiers'. The enormous casualties of the Great War brought into prominence the question of burial and of the upkeep of the graves of the dead. In the case of the British Empire it was agreed at the Imperial Conference of 1918 that such graves should be maintained permanently. To deal with the matter the Imperial War Graves Commission was constituted, which consists of the Secretaries of State for War, the Colonies, India, the First Commissioner of Works, High Commissioners of the Dominions and various other prominent persons. The Prince of Wales is President and Major-General Sir Fabian Ware Vice-Chairman. In every battlefield of the Great War proper cemeteries have been made and head-stones and other means of

identification provided. Areas have been searched for the 'missing,' their identity established and proper burial carried out. Visits to the cemeteries are organised, particularly on the occasion of the unveiling of a general memorial. Much detail can be obtained from the Annual Report of the Imperial War Graves Commission.

Graves, Thomas, Lord (c. 1725–1802), an admiral who served in many famous expeditions, among which may be mentioned the engagement in Chesapeake Bay in 1781, and the operations against the Fr. in Hudson Bay.

Graves, Sir Thomas (c. 1747–1814), an admiral; the first cousin once removed of Admiral Thomas Lord G. In 1773 he went on a voyage of discovery in the Arctic Seas with Lord Mulgrave. He was in command of the *Bedford* during the action in Chesapeake Bay, and was present in the engagement at St. Kitts. In 1783 he fought the Fr. frigate *Sybilie*, and, later, was at the battle of Copenhagen.

Gravesend, a municipal bor., river port, and market tn. in Kent on the r. b. of the Thames. It is mentioned in Domesday Book under the name of 'Graves-ham,' and was one of the bishop of Bayeux's lands. It is situated at the foot of a range of hills which extend about 2 miles along the Thames river. It was formerly the chief station for East Indianmen and its trade was chiefly the supply of shipping; the stores now taken in by ships are few. It is defended by three forts on the Kentish coast, and Tilbury fort on the Essex side. It is the boundary of the port of London and is also a noted yachting station. The borough includes Northfleet and the rural districts of Hoo and Strood and returns a member to Parliament. There are two piers—the Town pier, built 1834, and the Royal Terrace pier, built 1845; it is also a principal pilot station and has a Custom House. A large fishing trade is carried on and also a trade in market gardening and hops. There are besides brick-fields, iron foundries, boat builders, etc. Pop. (1921) 31,137.

Graville St. Honorine, a tn. in France in the dept. Seine-Inférieure, about midway between Havre and Harfleur. It has copper, zinc, and lead mines. Pop. about 13,000.

Gravina, a tn. of Southern Italy in the prov. of Bari, about 32 m. from the tn. of Bari. The town is surrounded with walls and towers, and a castle of the Emperor Frederick II. rises above the town. Pop. 22,500.

Gravina, Giovanni Vincenzo (1664–1718), a jurist, b. at Rogiano, near Cosenza in Calabria. In 1699 he occupied the chair of civil law in the

college of La Sapienza, and in 1703 that of canon law. He wrote: *Origines juris civilis*, which established his reputation as a jurist; *De Romano inferio*; *Della Ragion Poetica*, and several tragedies.

Gravitation, a term used in physical science for the mutual attraction between masses of matter. The full statement of Newton's law of gravitation is: *Every particle of matter in the universe attracts every other particle with a force whose direction is that of the line joining the two, and whose magnitude is directly as the product of the masses and inversely as the square of their distance from each other.* In order to marshal the evidence for this great generalisation it is convenient to consider it under the following heads: (a) The direction of the force between the particles; (b) the law of inverse square of distances; (c) the universality of the law of inverse squares; (d) the proportionality of the force of attraction to the product of the attracting masses.

Newton based his investigation into the law of gravitation on the three laws deduced by Kepler from the astronomical observations of Tycho Brahe. Kepler's laws are purely kinematical. They completely describe the motions of planets, but they say nothing about the forces by which these motions are maintained. Their dynamical interpretation was discovered by Newton. *Law 1*: Each planet describes an elliptical orbit. The sun occupies one focus of the ellipse. *Law 2*: The radius vector of each planet sweeps out equal areas in equal times. *Law 3*: The square of the periodic time (in an elliptical orbit) is proportional to the cube of the major axis of the ellipse.

(a) As an immediate consequence of Law 2, Newton showed that the direction of the attraction of the sun for a planet must be that of the line joining them. For twice the area described by the radius vector of a planet in one second is numerically equal to the moment of its velocity about the centre of the sun. Hence, as the moment of the velocity of the planet is constant, the moment of each successive increase of velocity must be zero. Hence these increments in velocity (i.e. the accelerations) must be directed towards the sun. But the direction of the acceleration must coincide with the direction of the force which causes the acceleration. Therefore the force of attraction must be directed towards the sun.

(b) The acceleration of the planet can readily be calculated to be $4\pi^2 \frac{a^3}{T^3} \cdot \frac{1}{r^3}$, where a is the semi-major axis of its elliptical path, T the

periodic time, r the distance of the planet from the sun. Hence the acceleration of the planet is inversely proportional to the square of its distance from the sun. Therefore the force of attraction due to the sun varies inversely as the square of the distance.

(c) Kepler's third law states that $\frac{T^2}{a^3}$ is the same for all planets. Hence it is the same gravitation, diminishing as the square of the distance increases, which acts on each one of the planets. In other words, the force of attraction due to the sun does not pay any attention to the quality of matter. The inverse square law is universally true for every kind of matter.

(d) The expression $4\pi^2 \frac{a^3}{T^2} \cdot \frac{1}{r^2}$ shows that the acceleration of a planet towards the sun depends only on its distance r from the sun, since $\frac{T^2}{a^3}$ is

constant for all planets. Hence the force acting on a planet due to the sun's attraction is proportional to the mass of the planet. Since action and reaction are equal, each planet reacts on the sun with a force equal and opposite to that exerted by the sun or the planet. Hence each planet acts with a force proportional to its own mass and inversely as the square of the distance away. We must therefore conclude that the sun, which is a planet of great magnitude, also acts with a force proportional to its own mass. Hence the force acting on a planet due to the sun is (1) proportional to the mass of the planet; (2) proportional to the mass of the sun, i.e. the force is proportional to the product of the attracting masses. In the above discussion the dimensions of the sun and planets have been considered as inappreciable compared with their distances apart. Measurement shows that they are approximately spherical; is, then, the attraction exerted due to the attracting body as a whole, or is it due to its separate particles each acting independently? Newton attacked the question by assuming the law of gravitation for the separate particles of a body, and thence finding the law of attraction for the body as a whole. He thus arrived at two exceedingly striking theorems: (1) A spherical shell of uniform matter exercises no attraction on a particle inside it. (2) A spherical shell of uniform matter attracts an external particle as if its whole mass were concentrated at the centre.

An obvious corollary from the second theorem is that a sphere made

up of uniform concentric shells attracts, and is therefore attracted by all external bodies, as if its whole mass were concentrated at its centre. Since the planets behave as if their masses were concentrated at their centres, and since their departures from this behaviour can all be accounted for by their want of sphericity, there is very strong presumption that the attraction is the resultant of all the attractions, each particle of mass m of one body exercising on a particle of mass n of another body an attractive force of $\frac{Gm \times n}{d^2}$, where d is the distance be-

tween the two particles, and G is a constant—the constant of gravitation. The law of gravitation is unique among the laws of nature in the fact that it is unaffected by any condition or cause whatsoever. The force of attraction between two electrified charges is modified by the medium intervening between them, and also by their relative or absolute motions. But no conditions to which matter has ever been subjected have been found to affect its gravitation in the slightest degree.

Determination of the mass of the earth and the mass of the sun.—Astronomical observations enable us to compare the masses of the various members of the solar systems. For example, the acceleration of the earth towards the sun is about 0.6 cm. per sec. per sec.; the distance between the two is 15×10^{12} cms. The acceleration of the moon towards the earth is about 0.27 cm. per sec. per sec., and the distance between them is 4×10^{10} cms. If S is the mass of the sun, E the mass of the earth, M the

mass of the moon, then $\cdot 6 = \frac{GS}{(15 \times 10^{12})^2}$

and $\cdot 27 = \frac{GE}{(4 \times 10^{10})^2}$, therefore the ratio

$\frac{S}{E} = 300,000$ approximately. To de-

termine S and E in terms of the terrestrial standards of mass, the kilogramme and the pound, recourse must be had to experiments with terrestrial masses. A body of mass m suspended at the earth's surface is attracted by a force $\frac{G \times E \times m}{R^2}$, where E is the

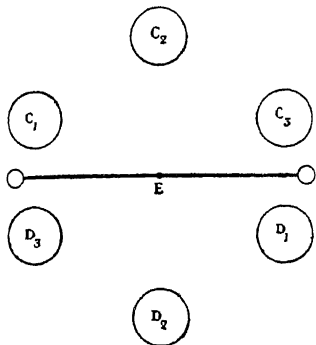
mass of the earth. But if g is the acceleration of a body falling freely under the influence of the gravitational force of the earth, the value of this force is also expressed by mg . Then $mg = \frac{G \times E \times m}{R^2}$ or $E = \frac{gR^2}{G}$. To

determine G the force F between two artificially prepared masses M_1 and M_2 at a distance apart d is measured,

and since $F = \frac{GM_1 \times M_2}{d^2}$ we get at once

$$G = \frac{Fd^2}{M_1 M_2} \therefore E = \frac{g \times R^2 \times M_1 \times M_2}{Fd^2}$$

Cavendish's experiment.—An experiment for determining the force of attraction between two artificial masses was first planned by the Rev. John Mitchell who did not live to begin work on the apparatus which he had designed and completed. After Mitchell's death, the apparatus came into the hands of Henry Cavendish, who largely reconstructed it but adopted Mitchell's original plan. The attracted masses consisted of two small balls, A and B, an inch or two in diameter, connected by a stiff wooden beam suspended at its middle point E by a long fine wire.



The whole of this part of the apparatus was enclosed in a case, carefully coated with tinfoil to secure, as far as possible, a uniform temperature within the case. Irregular distribution of temperature would have resulted in convection currents of air which would have had a serious disturbing effect on the suspended system. To the beam was attached a small mirror with its plane vertical. A small glazed window in the case allowed any motion of the mirror to be observed by the consequent deviations of a ray of light reflected from it. The attracting masses consisted of two equal, massive, lead spheres, so mounted that they could be made to move from the positions $C_1 D_1$ to the positions $C_2 D_2$ or $C_3 D_3$. Cavendish found that the suspended system was never at rest. The equilibrium position was determined by the method usually employed when weighing with a delicate balance. When the large masses were placed at $C_2 D_2$, the oscillations were practically

due to the torsion of the wire. If T is the period of vibration for this position of C and D , and I the moment of inertia of the suspended system, then $\mu = \frac{4\pi^2 I}{T^2}$, where μ is the

couple required to twist the lower end of the wire through torsion relatively to the top end. The angle θ through which the beam was deflected when the attracting masses were moved from the positions $C_1 D_1$ to the positions $C_2 D_2$ was measured. Then $\mu\theta = \frac{2G \times M \times m}{d^2} \times l$, where l is the

length of the beam and d the distance between the centres of the attracting and attracted masses. Whence $G = \frac{\mu\theta d^2}{2M \times m} = \frac{2\pi^2 I \theta d^2}{T^2 M m}$. The experiment

has been repeated by Reich, Bailey, Cornu, Boys, and Braun. Cavendish obtained for the value of G 6.6×10^{-8} dynes, Reich 6.613×10^{-8} , Bailey 6.685×10^{-8} , Boys 6.6576×10^{-8} , Braun 6.65786×10^{-8} . The remarkable agreement between the results of these experiments, which were performed at different times and at different places on the earth's surface, provides a powerful confirmation of the truth of the law of gravitation.

Cause of Gravitation.—The cause of G remains undiscovered. Newton, in his celebrated *Letters to Bentley*, says: 'You sometimes speak of gravity as essential and inherent to matter. Pray do not ascribe that notion to me; for the cause of gravity is what I do not pretend to know, and therefore would take more time to consider it. It is inconceivable that inanimate brute matter should, without the mediation of something else which is not material, operate on and affect other matter without mutual contact, as it must do if gravitation in the sense of Epicurus be essential and inherent in it. . . . That gravity should be innate, inherent, and essential to matter so that one body may act upon another at a distance through a vacuum, without the mediation of anything else, by and through which their action and force may be conveyed from one to the other, is to me so great an absurdity, that I believe no man who has in philosophical matters a competent faculty of thinking, can ever fall into it. Gravity must be caused by an agent constantly acting according to certain laws; but whether this agent be material or immaterial, I have left to the consideration of my readers.'

Attempts have been made to account for G by means of stress in the intervening medium on the plan adopted for electric and magnetic forces. Calculation shows that the

stress which must be supposed to exist in the invisible medium must be 3000 times as great as that which the strongest steel could support. Le Sage's theory that the gravitation of bodies towards each other is caused by the impacts of streams of atoms flying through space leads to the inverse square law of attraction, but it demands that the rate at which the energy of the bombarding atoms is spent in order to maintain the gravitating property of a single pound is at least millions of millions of foot-pounds per second. In fact, all the theories which have been advanced to account for gravitation imply the existence of stresses or the presence of stores of energy absolutely gigantic in comparison with anything hitherto observed or even suspected to exist in the universe.

States is his most important work, but he also published a *Botanical Text-book*, *How Plants Grow*, *How Plants Behave*, *Synoptical Flora*, and the *Botany of Japan in Relation to North America*, which is in point of originality and far-reaching results his *opus magnum*.

Gray, David (1833-61), a Scottish poet, b. at Merkland, near Glasgow. He was educated at Glasgow University for the church, but at an early age began to write verses. He became intimate with the poet Robert Buchanan, with whom he went to London in 1860. There he became acquainted with Lord Houghton, who gave him some literary work and endeavoured to get his poem *The Luggie* published in *The Cornhill Magazine*. This poem, a reminiscence of the scenes and events of his child-



GRAVOSA

[Canadian Pacific

Gravity, Centre of, see CENTRE OF GRAVITY.

Gravity, Specific, see SPECIFIC GRAVITY.

Gravosa, the fortified harbour of Ragusa in the state of Yugo-Slavia. It is a seaport and fishing-town. Pop. 1500.

Gray, a com. of France, on the l. b. of the Saône in the dept. of Haute-Saône. It has a fine quay on the riverside and carries on a busy trade. Pop. 6500.

Gray, Asa (1810-88), an American botanist, b. in Paris, New York. He received only an ordinary education and at the age of sixteen began his collection and study of plants. In 1842 he accepted the Fisher Professorship of Natural History at Harvard University and devoted himself to the establishment of a herbarium and a library there, giving up his own collection of plants to the former and his books to the latter. He made a special study, with Dr. Torrey, of the *Flora* of N. America, and two volumes were published on this subject in 1838 and 1843, respectively. He was also an enthusiastic supporter of Darwin's theory of evolution. His *Manual of the Botany of the Northern United*

hood, is his chief work, but he also wrote a series of sonnets, *In the Shadows*, which have a beauty all their own.

Gray, Elisha (1835-1901), an American inventor, b. at Barnesville, Ohio. He studied for a time at Oberlin College, but afterwards took up the subject of telegraphy, and in 1867 patented a telegraphic switch. He also experimented with the telephone, which he claimed to have invented, his application for a patent being received only a few hours after Alexander Bell's. He was engaged for some time in the manufacture of telegraphic apparatus, and was the electrical expert of the Western Electric Company of Chicago. Among his inventions are the multiplex telegraph, by which eight messages can be sent at a time, and the telantograph, by which handwriting can be transmitted.

Gray, John Edward (1800-75), an Eng. naturalist, b. at Walsall. In 1840 he was appointed keeper of the Zoological collections and made them the most complete in the world. He wrote many books, the most important being his catalogues of the British Museum collections.

Gray, Thomas (1716-71), an Eng. poet, b. in London, and educated at Eton and at Peterhouse College, Cambridge. Of a studious and reserved nature, he formed few intimate friendships, but these were lasting ones. The story of his life is simple and colourless, the outstanding event in it being his tour on the Continent with Horace Walpole, 1739-41. Their unfortunate quarrel, late in this tour, which was not healed for three years, was the only break in a life-long attachment. Returning to England, G. found his father dying and his mother only moderately provided for. After residing with her for a while at Stoke Poges he went back to Cambridge, where, except for brief intervals, he spent the rest of his life. He had always a tendency to melancholy, the best cure for which would have been plenty of exercise and cheerful company; of the former, however, he took little, and the latter he was too reserved to enjoy freely. Yet he was naturally very humorous, and his letters, charming in their mixture of fun, sincere friendliness, and wise criticisms of men and books, are worthy to stand with those of Lamb. His learning was immense, not only in the classics, but also in art and natural science. He holds an honourable place in Eng. literature, though his works are small in quantity, and in quality do not attain the highest rank, even the immortal *Elegy* owing its fame to exquisite expression and natural pathos rather than to greatness or originality of thought. But if this, the Odes, and the translations from the Norse be compared with anything written by his immediate predecessors (except Thomson), it will be seen that G. was a pioneer, a true poet in a prosaic age, and the forerunner of Goldsmith and Cowper in breaking away from the monotonous artificiality of early eighteenth century verse. No wonder that Johnson, who condemned *Lycidas*, failed to appreciate *The Progress of Poesy* and *The Bard*, but it is quaint to find the author of *Rasselas* complaining of the 'cumbersome splendours' of G., and elsewhere of his 'dullness.' Other contemporaries called him obscure. G. was one of the first to celebrate the glories of mountain scenery. While other writers were still shuddering at 'horrid precipices' and 'frightful solitudes' he was enthusiastic in his admiration of the Alps, and later of the Grampian and Cumbrian peaks. See Gosse's *Gray's Works*, 1884, and Life, 1889; *Poems and Letters* (Everyman's Library), and Matthew Arnold's fine essay on Gray.

Grayling, a fresh-water fish of the

salmon family having a long many-rayed dorsal fin. It is found in the N. of Europe, Asia, and N. America. The British G. generally inhabits rivers with a rocky or gravelly bottom, and is in best condition when trout are out of season.



GRAYLING

Grayling Butterfly (*Hipparchia semele*), a butterfly widely distributed over the British Isles. It has dark-brown wings with two black eye-spots on each of the fore-wings and one black eye-spot centred with white on the hind-wings. It is found on heaths and in dry stony places, especially on chalk and in clearings in woods.

Gray's Inn, see INNS OF COURT.

Gray's Thurrock, a par. and tn. of Essex, England, situated on the Thames, 3 m. N.W. of Tilbury, and 12 m. S.E. of Romford. There are two training ships, and a trade in cement, lime, and bricks. A portion of Rom. tessellated pavement and other antiquities have been found here. Pop. (1921) 17,364.

Graz (Grätz until 1843), a tn. of Austria, capital of Styria, on the Mur, at the head of the valley's expansion round the foot of the hill, Schlossberg. There is a railway communication both N. and S. across the Mur's valley, and E. by the valley of the Raab. It is a bishop's see, and has numerous buildings of interest. Amongst these are the university (1586, new buildings 1890-95); fifteenth century Gothic cathedral (with fine altar-pieces and glass-paintings); mausoleum of Ferdinand II., with sarcophagi of his parents, the Archduke Charles and his wife; thirteenth century Gothic parish church of the Teutonic knights; Landhaus (1569), in Renaissance style; the Joanneum with natural history library, given by the Archduke John (1811); arsenal (1644); eleventh century castle. The Castle Hill was fortified till 1809, and there is a curious clock-tower on the Schlossberg. There are cold mineral springs at Radegund near by, and the health-resort, Tobelbad. A polytechnic was opened 1888, and there are other educational institutions. Manufs. include machinery, rails, ironwares, paper, leather, soap, beer, hats, and wine. The lignite of

Kainach valley, the chief mineral fuel deposit of the Alps, is important. Population 152,706. See Gsell Fels, *Gratz und seine Umgebung*, 1897.

Grazzini, Antonio Francesco (1503-83), an Italian poet and dramatist, founder of the Accademia degli Umidi (Florentine Academy), 1540, assuming the name 'Il Lasca' (mullet, or barbel). He was also later chief founder of the Accademia della Crusca (1550), formed to perfect the Tuscan language. His works include a collection of tales in the style of Boccaccio's *Decameron*—*La prima e la seconda Cena* (selections appearing as *Le Cene*, 1756); sonnets, satirical poems, and comedies; *Gelosia*, 1568; *La Spiritala*, 1561; *I Parentadi*, *La Pinzochera*. His works were considered 'testi di lingua' by the Della Cruscan Academy. See Fanfani's 'Vita del Lasca' in *Le Cene ed altre prose*, 1857, and edition of the *Commedie*, 1859; Ginguené, *Histoire Littéraire d'Italie*, 1810-24.

Great Barrier Island, or **Otea**, an island of New Zealand, about 20 m. long, on the E. coast of N. Island. To the W. is a small island known as Little Barrier Island.

Great Barrier Reef, a series of coral reefs off the E. coast of Australia, about 1250 m. in length. In its widest part it is 100 m. broad and is 150 m. from the coast, but towards the N. it comes nearer the land, and in some places is only 10 m. distant. The reef can be seen at low tide, but can always be distinguished by the breakers which wash over it. The reef is not continuous, but is broken up by many deep channels, the chief of which are the Bligh Entrance, the Olinda Entrance, the Raine Entrance and Flinders Passage. The channel between the reef and the coast is a valuable route of communication for steamers owing to the calmness of the sea, but careful navigation is necessary, especially at night, when the reef can scarcely be discerned; hence sailing vessels only use the route by day. The most valuable products of the reef are pearls, pearl shells, and trepangs.

Great Barrington, a tn. in the Berkshire co. of Massachusetts, U.S.A., on the Housatonic R. about 12 m. from the S.W. corner of the state. It is a popular summer resort. The chief manufactures are cotton and woollen goods, electrical appliances, paper, etc. There is a good building-stone quarried in the district. The Sedgwick Institute is situated here. Pop. 5934.

Great Basin, a large region of drainage in the U.S.A. which includes nearly all Nevada, Utah, Oregon, and

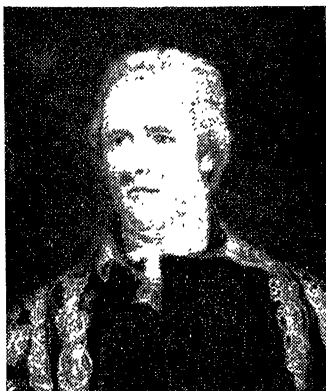
California, and lies between the Sierra Nevada on the W., and the Wasatch Mts. on the E. Mountains run from N. to S. of it, and rise to a height of 4000 ft. above the plateau. The soil is fertile where irrigation can be applied, but the hills are barren. It has numerous lakes, most of which are salt, the chief being Great Salt Lake, Lake Utah, Lake Sevier, Lake Walker, and Lake Carson. The mountains are rich in minerals, especially silver ore.

Great Bear Lake, see BEAR LAKE, GREAT.

Great Britain. The Act of Union (1707) made England and Scotland one united nation under the name of G. B., and the accession of George I. in 1714 is a convenient point to commence the history of that nation. The Protestant succession in 1714 was the final step in the Revolution of 1688, the vindication of the principles of Protestantism and election of the monarch by parliament. Further, it marked very distinctly a new era in the constitution. The king was a foreigner, and a figure-head; the real power had passed from the hands of the crown into the hands of the parliament, and during the eighteenth century that meant that the power remained in the hands of the great Whig families. These families had been responsible for the Revolution of 1688, and for the peaceful succession of George I., but they were inspired by no feelings of loyalty, rather they regarded the matter as a financial speculation, and supported the Hanoverians because, whilst a Protestant sat on the throne, their funds were safe. The first two Hanoverian kings had little, if any, doubt as to the exact feelings of their subjects. The first event of importance during the reign of George I., was the Jacobite Rebellion of 1715, which was really of little importance and which hardly stirred the absolute apathy of the nation. During that rebellion the Septennial Bill was passed, prolonging the duration of parliament to seven years instead of three. This was obviously an Act passed in order to prevent an election during these troublous times, and was but a temporary expedient. It lasted, however, down to the passing of the Preamble to the Parliament Bill of 1910, which reduced the duration of parliament to five years. One important development also took place. The king no longer attended cabinet councils; his place was taken by a first or prime minister. The system of party government had been developed previously, but now the entire personal element of the crown

was eliminated. Under kings who simply regarded England as a source of revenue the plan worked well, but under more ambitious kings it was apt to become a trifle irksome. The mania for speculation, which broke out during this reign and was really one of the results of the Treaty of Utrecht, culminated in the South Sea Bubble, which broke, reducing many people in England to penury. The ministry could not entirely exonerate itself, but financial matters were put right by the genius of Walpole. From 1721-42 Walpole ruled the country. This period of office was a period of stagnation, nothing happened, affairs dragged themselves quietly along, other countries took part in wars, England stood aloof and prospered. Walpole was intensely fond of power and could brook no rival, hence we find during his period of office the Whigs themselves began to be divided, and the discarded rivals of Walpole led the opposition. The Patriots and the Bays were two such parties. In 1727 George I. had died and his son had succeeded. George II. had no love for Walpole, but guided by his wife, Caroline of Anspach, he retained Walpole in office. In 1733 Walpole introduced his famous excise scheme, a scheme which was years ahead of his time, but withdrew it rather than resort to extreme measures. In 1739 he declared war with Spain, the War of Jenkins' Ear, which ran on into the War of the Austrian Succession, and in 1742, finding his majorities continually dwindling, he resigned. It is important to notice during this century that in every war which we fought we either were in direct opposition to France or ranged amongst the allies on the opposite side. Also the wars were no longer European wars solely, but struggles for colonial and maritime supremacy. The European wars were repeated in India and America, and often even, when the two countries were at peace at home, war was going on in the colonies. During the War of the Austrian Succession, the second and last Jacobite rising took place. Again it illustrated the apathy of the country at large, but this time, owing to more efficient leadership, England was invaded and the Pretender reached Derby. That day has since been known as Black Friday. The government were seriously upset, the only person who scoffed at the danger being the king himself. But from Derby the Pretender had to retreat and was finally defeated at Culloden, and after many adventures got safely out of the country. One other point deserves

notice here, and that is the battle of Dettingen in 1743, when for the last time a British sovereign led his troops in person. The War of the Austrian Succession ended with the Treaty of Aachen (1748), and eight years later began the Seven Years' War. During this war William Pitt the Elder became Minister for War, and owing to his genius the war was the most successful that we had yet waged. He set himself to conquer India and America on the plains of Germany. He instituted a system of financing the English allies, keeping France busy in that way on the Continent, and attacking at the same



WILLIAM PITT, EARL OF CHATHAM

time India and America. During this war we definitely established the beginnings of an empire in India, and Canada also passed into our hands. France had been defeated in both countries. Before the end of the war George II. died. He had not been unpopular, and he was certainly respected throughout the country. He was succeeded by his grandson, George III., the eldest son of Frederick Prince of Wales, who had predeceased his father. George III. (*q.v.*) was ambitious and had been dangerously educated. He, however, proudly proclaimed that he gloried in the name of Briton. Before he had been on the throne long, Bute, his tutor, was in possession of the premiership. Pitt had resigned and a peace had been signed by which we obtained much, but not so much as would have been obtained with a competent man at the head of affairs. The early part of the reign resolved itself into a struggle between the

king and the Whigs. The king desired personal rule, and ultimately he, for a short time, obtained it. One of the indirect results of the cession of Canada to Britain was the outbreak of war with the colonies. The English parliament declared itself capable of taxing the colonies. The colonies protested that taxation went with representation. The government, under Grenville, remained obstinate; the king regarded the colonists as rebels from the first. Conciliation was tried, but it was useless conciliating with one hand and irritating with the other, and finally, in 1775, war broke out and in the following year the Americans declared their independence and became a republic. By 1778 the war was extended and England found herself fighting practically the rest of Europe. In America she was defeated at Yorktown, and the surrender of Cornwallis there in 1781 sealed the fate of America. Against France and Spain she was more successful, and the victories of Rodney in the W. Indies and the failure of the Spaniards to recover Gibraltar enabled England to come out of the war with flying colours, but, nevertheless, at a lower pitch of power than she had reached before in the century. America's independence was of course recognised. The disasters of the American War put a period to the personal power of the king, although he was still able to influence events by the use of the body of politicians known as the King's Friends. That series of changes in the economic world usually known as the industrial revolution began to become prominent just about this time. Change seemed to be in the air. The fiscal system was altered; the influence of Adam Smith's *Wealth of Nations* was felt; Free Trade began to be seriously spoken of; parliamentary reform found some bold and strenuous advocates, and then came the greatest event of all—the French Revolution. For over four years that revolution remained disregarded by this country, save in as far as it found some supporters but more enemies. The peace of Europe was held to be unaffected by it. Pitt himself declared the year before the outbreak of war that peace with France had never been so secure. Then, in 1793, Louis XVI. was executed, and the international treaties of Europe torn up by France. The republic desired to fight Europe, and speedily Europe found that the fight was not so unequal after all. But the enthusiasm of the Revolution calmed down, the natural genius of the people slowly returned, and step by step they were led by

Napoleon (*q.v.*) until the republic was a consulate and then an empire. Still the menace of imperial France was as great as that of republican France, and certainly it is due to the fact that it was impossible to invade and conquer England that Europe was saved. Every other country in Europe suffered from actual invasion, but as Pitt said, England saved herself by her courage and Europe by her example. Waterloo decided the fate of Europe, and Napoleon was sent to the island of St. Helena. Undoubtedly the victory had been due to a very great extent to the resources of England; without her manufactures even her enemies could not exist. The Berlin decrees failed owing to the number of exceptions which Napoleon had to make. During the reign of George III. England had begun to change from an agricultural to an industrial nation. The new manufactures had led to new roads and new means of transit; it was obviously necessary to obtain quick transit for goods, and necessity was the mother of invention. Roads were better constructed, canals were made all over the country, and finally came the steamship and the steam-engine. The period which followed the war was one of great distress. Economic troubles took place all over the country. The new machinery was attacked, and the increasing numbers of soldiers returning from the war made affairs worse. In 1819 the great riots broke out, and at Manchester the mob was charged by the military and a number of the rioters were killed; this event is known as the Manchester Massacres or Peterloo. (For details see Prentice's *Manchester*, where it is stated that the assembly was 'peaceable' and that there was no riot.) In the meantime the demand for reform had continued, but the Revolution had stopped all chance of immediate reform. Anything savouring of reform was regarded as revolutionary, and anything revolutionary was anathema with the vast majority of the people of the country. Catholic emancipation had been mooted at the time of the Union (1800) (see IRELAND—*History*), but the king had refused to hear of it, and Pitt, rather than break his promise to the Irish, resigned. The king, who had now for some considerable time been incapable of ruling, died in 1820, weak, old, blind, and insane. His son, the Prince Regent, became king as George IV.

The death of George III. in 1820 makes practically no difference in the history of the nation. The King had been imbecile and blind, and the

accession of the regent made but little change. The effect of the Revolution in France, however, was tremendous, and this intellectual awakening, stimulated by and stimulating the movement which we know as the Industrial Revolution, brought in its train results of the highest significance. There has probably been more real progress packed into the years of the nineteenth and early twentieth centuries than into the whole of the preceding history of the world. Democracy, hitherto an ideal which could not be attained, became not only a possibility but, during the later years, a reality. During the reign of George IV. toleration became a real thing in spite of violent opposition, the Test and Corporation Acts were repealed, and a Bill for the relief of the Catholics was passed as well. These changes seem nowadays but small and necessary; to the age which passed them they were practically revolutionary. It is necessary also to remember that the close of the Napoleonic wars had been followed by a reaction in almost every country in Europe, and, in spite of this, revolutionary measures were passed in G. B. In 1830 George IV. *d.*, and was succeeded by his brother, William IV. To what extent the principles which were then called Radical had supplanted the solid and, to a certain extent, unreasoned Toryism of the previous century may be gauged from the measures that were passed during this reign. The agitation for a Reform Bill at last had its reward in the passing of the great Reform Act of 1832, to the aristocracy of the time the beginning of the end of all things. Slavery was abolished, a Poor Law was passed, legislation for the protection of the worker passed and municipalities received attention also. In 1837 William IV. *d.*, and was succeeded by his niece, Queen Victoria, whose long reign witnessed so much change and progress. The reign can be well divided into three distinct periods: the early Victorian—an age of constant turmoil and bustle, during which Europe was agitated by countless revolutions: an age which regarded monarchies, to a certain extent, as necessary evils. Of the second period all that need be said of it is that it was Mid-Victorian—an epithet that carries its own condemnation; and the last period an age of transition, of preparation for a great awakening, during which loyalty seemed to be tinged almost with a maudlin sentiment which passed for pious reverence. The early period witnessed the repeal of the Corn Laws and the great Chartist agita-

tions, together with the beginning of the great Irish question. The year 1848 was called the year of the Revolution; all Europe was in a state of unrest, and every side of the social fabric seemed to be agitated. The forties witnessed the Scottish Disruption movement and the Oxford movement, both indications of the state of unrest. Commercially G. B. was prospering and progressing by leaps and bounds. The great European wars had left her the workshop of the world, and for a time she had no competitors at all. Politically her progress was equally great, while the great parties still remained fairly true to the old ideas; nevertheless the Liberals, who represented the Whigs, and the Conservatives, who represented the Tories, were both being gradually tinged with the democratic spirit. The people were at last being recognised as a real factor in political existence, but this fact must *not* be overestimated. The power of the crown and of the landed proprietors was as great as ever, but was skilfully disguised. The power of the House of Lords, although still great, was not great enough to compete with the Lower House, and gradually from this period the power of the House of Commons increased until it is now recognised as the greatest power in the legislature. It will perhaps be best here to review as briefly as possible the main political events of the period from 1830 to the present time. The Reform Bill of 1832 stands out as the great event of the ministry of Lord Grey, and before this ministry relinquished office they had attempted the reform of the Poor Laws and had introduced the first Factory Act. Melbourne became Prime Minister in 1834, and although the ministry was dissolved by the king, the Tory minister, Peel, after trying to hold office with a minority in the House of Commons, resigned, and Melbourne continued in office until 1841. In 1839, defeated on a question of the affairs of Jamaica, he resigned, and Peel was again sent for, this time by Queen Victoria, who had succeeded in 1837. The question of the change in the ladies of the bed-chamber, however, roused so much difficulty that Melbourne was again induced to accept office. In 1841 he dissolved parliament, and a Tory majority was returned. On the whole the ministry had not been very successful; they had passed the Municipal Corporation Act, and had introduced Penny Postage, but their policy in Canada and Jamaica had been bad, and the zeal for reform seems to have left the Whig party. The great event of the ministry of his successor, Peel, was the repeal of the

Corn Laws (1846). His financial measures were a great success, but were overshadowed by the great measure of repeal. The Irish famine forced his hand, and the head of a nominal Protectionist ministry introduced the greatest measure of Free Trade which the country had yet been given. The 'betrayal of the party,' as many Conservatives considered it, was bitterly attacked by a young politician, Benjamin Disraeli (*q.v.*), the future leader of the Conservative party. Peel was almost immediately defeated on the question of a Coercion Act for Ireland, and resigned, never to hold office again. The Tory party was split up by this measure, and the Peelites, chief among whom were Gladstone and Aberdeen, ultimately joined forces with the Whigs, whilst the Protectionists, under Bentinck and Disraeli, ultimately formed the Conservative party. Peel was succeeded by Lord John Russell, whose greatest difficulty during this period was the quelling of the Chartist riots. The Chartist demands were: manhood suffrage, vote by ballot, annual parliament, payment of members, abolition of the property qualification, and equal electoral districts. The great plan of the leader of this movement was the presentation of a monster petition to the House of Commons, but the procession failed, and almost half the total number of signatures in the petition were found to be forged. In 1851 Palmerston's somewhat cavalier methods of conducting affairs at the Foreign Office led to his resignation, and in 1852 he threw the ministry out by defeating them on the Militia Bill. The ministry was succeeded by Lord Derby's first administration, and this, after a short period of office, was succeeded by a coalition ministry under the leadership of Lord Aberdeen. Its chief ministers were: Aberdeen, Gladstone, Russell and Palmerston. It lasted only for three years—whence Disraeli's historic remark, 'England does not love coalition.' During its tenure of office, however, Gladstone definitely abolished all the remaining protective duties, and England became altogether a Free Trade country. Nevertheless this ministry's utter mismanagement of the Crimean War led to its overthrow in 1855. During the next ten years the outstanding figure in English politics was Palmerston. After two years' office he was defeated, but appealed to the country and was returned by a splendid majority, and later in 1858 his Conspiracy to Murder Bill was thrown out, and Lord Derby formed his second administration, which lasted only for fifteen months, after which Palmer-

ston again came into power. From this time until his death Palmerston was all-supreme. The main events of importance were those concerned with foreign affairs. The position of France and the ambition of Napoleon III. made very many apprehensive of France. Gladstone, who was by this time a Liberal, was rapidly making a name for himself as a great financial minister. The invasion scare of 1858 led to the formation of the volunteers, and in 1861 the Prince Consort died. In 1865 Palmerston died and was succeeded by Lord John Russell, who attempted to pass a Reform Bill but was so bitterly attacked by many members of his own party that he resigned, and was succeeded by Lord Derby. In 1867 Disraeli introduced a Reform Bill, and 'educating his own party' up to it, passed it. It was described by Lord Derby as 'a leap in the dark,' and contained many amendments accepted from Gladstone. From 1867 almost to the end of the century the field of politics is almost entirely occupied by the duel between Gladstone and Disraeli. Seldom have two statesmen of such genius been opposed to one another, or been so entirely different in character. In 1868 Disraeli became Prime Minister in succession to Lord Derby, but was defeated in the general election of that year and resigned before the end of the year. Disraeli was succeeded by Gladstone, who during the five years of his ministry passed more measures than almost any previous one. Education became compulsory, Trade Unions were legalised, the Ballot Act was passed. Under Cardwell the army was reformed, and the linked battalion method adopted. The Irish Church Act and a Land Act for Ireland were passed, and the state of Ireland at the time also necessitated Coercion Acts. But the ministry gradually became unpopular—even those sections of the community that would benefit most from the measures of the ministry turning against it—whilst the foreign policy of the government was decidedly unpopular, G.B.'s action towards Russia during the Franco-Prussian War and towards the *Alabama* claims of the U.S.A. being decidedly weak. In 1874 Gladstone resigned, and the Conservatives were returned to power, having for the first time since 1841 a real majority in the House of Commons. The ministry formed by Disraeli was a brilliant one, and the Opposition was for a time weakened by the withdrawal into private life of Gladstone. The great question of Home Rule was gradually forcing itself to the front, and the Irish tactics in the House became

obstructive. It was at this time that Disraeli put forward his imperial policy, and the ministry is chiefly noticeable for its attitude on foreign and imperial affairs. The Bulgarian atrocities led to the intervention of Russia and to the Congress of Berlin, from which England issued in 1878 with 'peace with honour.' Affairs in Africa and India also attracted much attention; the title of Empress of India was taken by the queen, and the majority of the shares of the Suez Canal became the property of Britain. In 1880, however, Disraeli, or Beaconsfield as he was now called, resigned, and was badly defeated at the polling booths. The renewed enthusiasm of the Liberals on the re-appearance of Gladstone and the 'swing of the pendulum' account to a large extent for this. Gladstone now formed his second administration. He again remained in power for about five years. During that time he was much troubled by the Irish question, and the agrarian outrages in that country led to the passing of fresh Coercion Acts. In 1882 Lord Frederick Cavendish was murdered. In 1880 the Boers were, after the defeat at Majuba, granted independence, and in 1885 the Egyptian question, which had necessitated the bombardment of Alexandria in 1882, was marked by the murder of Gordon at Khartum. In 1881 the second Irish Land Bill was passed, and in 1884 the Reform Bill became law. In 1885 Gladstone reigned and was succeeded by Salisbury, but he held office only for a short time. In 1886 at the general election the Liberals were again returned to power. Gladstone formed his third ministry, but his majority was dependent on the Irish. He determined, however, to introduce a Home Rule Bill, which led to grave dissensions in his own party. On a division on the second reading he was deserted by Hartington, Chamberlain, and Bright, and was defeated by a majority of thirty. He appealed again to the country, and was defeated. Lord Salisbury now formed his second administration. From 1886 to 1906, broken only by a short administration of the Liberals, the Conservatives were constantly in power. The introduction of the Home Rule Bill had seriously split the Liberal party, and later, at the retirement of Gladstone, differences became still more marked. The dissident Liberals called themselves Liberal-Unionists, and refused at first to co-operate with the Conservatives. The chief members of the second Salisbury administration were Lord Randolph Churchill, Sir Michael Hicks-Beach, and Mr. Balfour. The

Liberal-Unionists, however, gradually became willing to accept office, and in 1887 Mr. Goschen succeeded Lord Randolph Churchill as Chancellor of the Exchequer. In 1892 the Liberals succeeded to office, but after a second Home Rule Bill had been introduced and thrown out in the House of Lords, Gladstone definitely retired and was succeeded by Lord Rosebery. In 1895 the Conservatives again came into power, and the Liberal-Unionists



LORD JOHN RUSSELL

formed a coalition with them, the Duke of Devonshire (Hartington), Lord Lansdowne and Mr. Chamberlain accepting office. Mr. Chamberlain quickly made a name for himself as Colonial Secretary. In 1899 the Boer War broke out and was concluded in 1902. In 1902, after the Conservatives had again been returned to power at the 'Khaki' election (1900), Lord Salisbury died, and was succeeded by Mr. Balfour. During this administration the highly controversial Education Act was introduced, and in 1903 Mr. Chamberlain put forward the Tariff Reform scheme which succeeded in breaking up the Conservative party and led to the overwhelming victory of the Liberals at the election of 1906. Sir Henry Campbell-Bannerman formed the first administration, and was succeeded shortly before his death by Mr. Asquith (1908). The rejection of the Budget in 1909 by the House of Lords led to the introduction of the measure for the curtailment of the power of that House, and after a conference of

the parties had failed, the Parliament Bill of 1911 was introduced and finally, after a great struggle, passed, since the Prime Minister obtained from the king a promise to create enough peers to swamp the Tory majority in the House of Lords if the Bill were thrown out. Mr. Asquith's ministry continued until 1915 as Liberal and continued as coalition Gov. until 1916. G. B.'s entry into the Great War on Aug. 4, 1914, subdued political differences, but the Home Rule Bill and the Welsh Church Bill became law automatically, being the first measures to be passed under the new Parliament Act (*q.v.*). In 1915 a Coalition Gov. was formed comprising twelve Liberals, eight Conservatives and Unionists, one Labour member and Lord Kitchener. Legislation was passed to lessen any danger to war efficiency at home, especially with respect to war munition centres. In 1916 the Conscription Bill was passed. Industrial unrest at the Clyde munition works culminated in a series of strikes. The Defence of the Realm Act (*q.v.*) (D.O.R.A.) was applied and the leaders were deported. Meanwhile financial difficulties arose. The new Entertainments Tax (*q.v.*) was imposed. Adopted as a war measure, it is still regarded as a source of normal revenue. In April 1916 Irish volunteers in Dublin, during what appeared to be a holiday parade, seized the principal buildings, and a serious conflict with the regular troops took place. The rising was an expression of Sinn Fein (*q.v.*) hostility to the British Gov. Civil war was proclaimed. The rebellion however, was eventually subdued, though not before a hundred lives had been lost. An interesting domestic measure was the passing of the Daylight Saving Bill (*q.v.*). At first ridiculed, the originator of the idea, William Willett, is now recognised as a public benefactor. The death of Lord Kitchener at sea left the War Secretaryship vacant, and Mr. Lloyd George succeeded him. Zeppelin raids having taken place, lighting restrictions were enforced to minimise the conspicuousness of large towns. A Food Controller (*see* FOOD CONTROL), was appointed, and in Dec. Mr. Lloyd George became Prime Minister, being in close association with Mr. Bonar Law. In 1917 a new Irish Convention saw Irish prisoners released, among them Eamon de Valera (*q.v.*). Gen. Smuts accepted a place in the War Cabinet (*see* CABINET, IMPERIAL WAR), while the Whitley Councils were set up under the chairmanship of Mr. J. Whitley as a step towards

industrial peace. The protraction of the war by this time caused a system of 'rationing' of essential foods. At the end of the session (Feb. 1918) the People's Representation Bill was passed by which all men of twenty-one, and women of thirty, with residential or business qualifications, were given the franchise. Early in the same year the House of Lords gave its approval to the principle of the League of Nations (*q.v.*). In Sept. industrial disputes again occurred, charges of 'profiteering' were made and increased pay was demanded. Meanwhile rumours of peace encouraged the Irish to agitate for a settlement of their claims, but the Armistice had been signed before any definite step could be taken, and the end of the war meant the end of a war Gov. Parties returned to their old distinctive groups, though there was inevitable overlapping. The Labour Party came back with greatly increased strength, and challenged the Liberal position as the official Opposition. Irish Nationalists practically disappeared, while the seventy-three Sinn Feiners refused to take their seats, among them being Countess Markevitz, the first woman M.P. They formed a Dail Eireann (*q.v.*) (assembly of Ireland), and were the predominating force in that country. Gov. appointments included Sir S. B. Sinha, the first Indian member of the House of Lords, as Under-Secretary for India. In industrial relations peace presented her problems as insistently as war. The Miners' Federation called for nationalisation of mines, and formed with railwaymen and transport workers the Triple Alliance (*q.v.*). The Sankey Coal Commission settled the wages difficulty and recommended nationalisation, though its recommendation was not adopted. On June 28, the Peace Treaty was signed. In addition to its territorial and guarantee provisions, important industrial ambitions were included. Among social changes at home was the Women's Emancipation Bill, whereby women were no longer barred from professions hitherto restricted to men. During the year an Industrial Court (*see* CONCILIATION) was set up, composed of employed and employers, to settle trade difficulties. But Irish affairs continued to dominate domestic politics. A form of guerilla warfare had developed. The Irish Self-Determination League demanded recognition of the Republic and the evacuation of the 'English Army of Occupation.' In 1920 the Restoration of Order Bill did nothing to remedy the trouble, while added violence resulted

from alleged reprisals by the Auxiliary Irish Police, known as 'Black and Tans.' Martial law was proclaimed in many of the S. towns. With the intervention of Gen. Smuts in the following year a more favourable stage was reached, and eventually a truce was arranged and Ireland was granted Dominion Home Rule. (See also HOME RULE, IRISH FREE STATE.) In 1922 confidence in the Coalition Gov. diminished, a general election took place, and a Conservative ministry under Mr. Bonar Law was returned to power. Labour became the second party in the House. The

MacDonald enhanced his reputation over his conversations with France respecting the Dawes Reparations Plan. (See DAWES PLAN.) But the Gov.'s insecurity by this time had led to defeat, and once again a general election had to be faced. The notorious 'Red Letter' (see ZINOVIEFF LETTER), alleged to have come from Russian Communists demanding propaganda among Eng. Communists, affected the election, and the Conservatives, under Mr. Baldwin, were returned to power with an independent majority. In industry class feeling had become



A LEAP IN THE DARK, 1867

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Conservatives, however, had no clear majority, and on Mr. Baldwin's fiscal policy another general election occurred, resulting in a 'stalemate.' At the general election the following year the Labour Party assumed office under Mr. Ramsay MacDonald. In Feb. the Gov. formally recognised the U.S.S.R. of Russia, and in its first Budget removed the McKenna Duties (q.v.). Unemployment, now over the million figure, claimed immediate attention, and it was generally admitted that the problem was more difficult than any which the war had given rise to or aggravated. As Foreign Secretary, Mr.

bitter. The phrase 'class war' appeared in Trade Union literature. Mr. Churchill, in his first Budget, re-imposed the McKenna Duties. Unemployment gave rise to alarm. In the coal industry many mines were closed and many areas were reduced to destitution, especially in S. Wales. Meanwhile the Locarno Treaty (q.v.) was signed, and Germany was free to enter the League of Nations. In 1926 disturbances in China caused some misgiving. Civil war between Cantonese and Pekinese forces endangered British lives and property, and troops were dispatched to Shanghai. Fresh concern was

caused by events in the coal industry. Negotiations having failed, a general stoppage resulted, which led to the General Strike (*see STRIKE, GENERAL*). The Emergency Powers Act of 1920 was invoked and the Gov. took control of necessary supplies. Eventually the strike spread to the railways, transport-workers, newspapers, and iron and steel trades. Two and a-half million men ceased work. By the time it was 'called off' £30,000,000 had been involved. A Bill to secure longer hours in the mines was passed and discontent grew unchecked until Nov., when agreement was reached. Various expedients were tried to mitigate unemployment, among them the Industrial Transference Board, by which men were transferred to likely areas, and training schemes. There was unrest in the cotton industry and a deadlock followed protracted negotiations. Mr. Churchill's Budget of 1928 was notable for its De-Rating Scheme (*see DE-RATING*), a policy of granting rating relief to depressed industries; while in April diplomatic friction occurred with Egypt over certain legislation which offended British military obligations, and not until warships were dispatched was the crisis avoided. The Gov.'s Trades Unions Bill aroused fierce opposition from its Labour critics. By it a general strike was declared to be illegal, and in spite of violent criticism it became law. A diplomatic sensation was caused during the year by the police raid on Arcos, a Russian trading agency, and relations were severed with Russia as a result of the discovery of subversive propaganda. Nation-wide interest was aroused later by the revision of the Prayer Book. (*See also DAVIDSON, LORD.*) Parliamentary sanction was sought for its voluntary adoption. The measure was thrown out amid acrimonious hostility. In agriculture a further anxiety beset the Gov.: the industry demanded Gov. aid, and, receiving none, voiced its grievances with an emphasis which had its effect on the subsequent general election. Perhaps the happiest note of the year was the meeting in amicable discussion between organisations of employers and the Trade Union Congress. The beginning of 1929 saw political struggles overshadowed by the serious illness of the King, who was successfully operated on for pleurisy. Meanwhile the De-Rating Bill had grown beyond its original scope, and now, as the Local Government Bill, pursued a stormy passage, while unemployment had reached the ominous figure of over a million and a-half.

The Gov.'s Franchise Bill, whereby women received the vote at twenty-one (*see ELECTIONS*), and a desire for safeguarding among its supporters led to a general election. Labour returned to office, though without a working majority. Awaiting the new Gov. were unemployment, new treaties with Russia and Egypt, the ratification of the Anglo-American Naval Pact, sponsored by Mr. Kellogg. The threatened lock-out in the cotton industry took place in July, and after a stoppage of three weeks by half a million operatives, a return to work was effected by arbitration. By Aug. relations with Egypt were amicably settled, and the acceptance of the Young plan of reparations at the Hague coincided with the evacuation of the Rhineland (*q.v.* and *see also REPARATIONS*), and Mr. Ramsay MacDonald successfully terminated conversations with Mr. Hoover, thus accepting the Kellogg Naval Pact (*see also LONDON CONFERENCE*). A form of agreement was once again arranged with Russia, and the Unemployment Insurance Bill with its benefits was finally passed. But by 1931 unemployment had reached the startling figure of over two millions, and it becomes clear that the question is one which ought to be considered irrespective of party politics and that only a mobilisation of the Empire's resources is likely to provide any permanent solution.

Great Central Railway, was established in 1819 as the Manchester, Sheffield, and Lincolnshire Railway. In 1897 an extension was constructed from Annesley in Nottinghamshire to Quainton Road in Buckinghamshire, which enabled the company to bring its line to London by the Metropolitan Railway. After this it was known as the Great Central Railway, with its chief London station at Marylebone. For later development *see L.N.E.R.*

Great Circle, or Tangent, Sailing, was known at least as early as the sixteenth century; for John Davies refers to it in his *Seaman's Secrets* (1594). A navigator who sails along the arc of a great circle reaches his destination by the shortest route. A 'great circle' on a sphere is one whose centre corresponds with the centre of that sphere; in the case of the earth the equator and all meridians are imaginary great circles. An amateur consulting the map of the world as it is erroneously represented on Mercator's projection would naturally imagine that a ship's shortest course is along the 'rhumb' line, that is the straight line joining the two places concerned, more especially as the graph of the great circle, when plotted on such a map, must of necessity be

represented by a curve. But this is not so. On Mercator's map the curve of the great circle will always come on the polar side of the rhumb line. This explains why the curved course is really the shorter: the difference of latitude is the same for the curved and for the straight tracks, but the former, being on a higher circle of latitude, has the advantage of shorter degrees of longitude. Thus the nearer the voyage is to the polar regions, the greater will be the difference between the tracks. As a matter of fact sailors cannot take advantage of this in the Arctic and Antarctic regions, as other conditions, such as the existence of ice, make navigation unsafe. Thus if they wish to go from Australia to the Cape of Good Hope, they must follow what is called a 'composite' great circle in order to avoid the dangerous latitudes. In place of the 'vertex,' that is, the point on the great circle track which is farthest from the equator, they must substitute the most southerly latitude they dare touch. In practice it is impossible to keep the vessel always along the great circle: what happens is that it is steered in a series of courses, which are, roughly speaking, tangents to that circle, and it therefore follows that the greater the number of those courses, or, in other words, the shorter the tangents, the more nearly will the actual course approximate to the theoretical. Thus the ship is never headed direct for her destination till the latter is actually in sight, and traverses the meridians each time at different angles. A vessel steering a rhumb line crosses all meridians at practically the same angle. A rough means of discovering the great circle is to stretch a piece of string tightly between the places of arrival and departure on the earth's globe, and so locate a few points on the circle: an accurate measurement involves a knowledge of spherical trigonometry.

Great Dane, The, a large dog which became popular in England about forty years ago. It is very muscular and strongly built, but its movements are easy and graceful. It is faithful and trustworthy, and when first introduced into England was a favourite companion of both ladies and gentlemen; but when the order came into force commanding all dogs to be muzzled, this hound, having a will of its own, rebelled against being held in check, and being very strong, could not easily be kept under control, so had to be abandoned as a companion. It is now chiefly used as a show dog, but in the Middle Ages it was a sporting dog, and was employed to hunt

the wild boar and chase the deer, being very suitable for this owing to its great activity, muscular development, and power. It has been called by various names, 'German boarhound,' 'Great Dane,' 'Ulmer Dog,' or 'German Dogge,' and some say it originated in Germany. Anyhow, it was very popular there, and Prince Bismarck had a G. D. as companion and owned specimens for sixty years. One of his hounds, Tyras, is said to have attacked the Russian Prime Minister, Gortschakoff, when he was holding a spirited conversation with his master. Tyras was slate coloured, a type very popular in Germany, but the recognised colours for the English show dog are bluish-grey, red, black, pure white, or white with patches of colour. The dog has a long head, which it carries high, broad muzzle, blunt at the point, a large nose, small eyes deeply set, and very small ears. Its neck is rather long and well arched, the legs strong and straight, terminating in large round feet. The tail is long and has a slight curl at the end, and its hair is very short. The dog should not be less than 30 in. in height, and its minimum weight should be 120 lb.

Great Dividing Range, a mountain system in Australia, which extends from N. to S. near the E. coast, then turns W., terminating a little to the E. of the western frontier of Victoria. The highest summit is 7349 ft.

Great Eastern, a great ship planned in 1852 by Brunel and Scott Russell, and which was the largest in existence at that time. It was completed at Millwall in 1857, and was originally intended for the route to Australia round the Cape. In 1859 the ship was launched, but an explosion took place off Hastings and a trip across the Atlantic had to be abandoned. In 1860 the vessel reached New York in eleven days, and from 1869 the G. E. laid some of the telegraph cables across the Atlantic. She was broken up in 1888.

Great Eastern Railway, founded in 1862 from the Eastern Counties Railway incorporated in 1836. People sixty years ago were in the habit of ridiculing the Eastern counties and styled the railway 'the scapegoat of the companies.' This reputation was extremely difficult to overcome, but Lord Salisbury championed the cause of the Great Eastern and in 1867 after a grant from parliament the company rapidly developed. See L.N.E.R.

Greater Punxsutawney, a bor. in the Jefferson co. of Pennsylvania, U.S.A., about 62 m. from Pittsburgh. There are flour and silk mills, glass and bottle factories, car works, machine

shops and iron foundries. It is the centre of a large bituminous coal and coke region. Farming and stock raising are carried on to a large extent. Pop. 9266.

Great Falls, a city in the Cascade co. of Montana, U.S.A., on the Missouri R., about 10 m. from the G. F. of the Missouri, from which it derives its name. It is in the centre of a rich mining district, and is an important shipping point for wool, live-stock, and cereals; 7,000,000 pounds of wool are shipped annually. Copper-smelting is carried on to a large extent. There are also railroad shops, flour mills, oil refineries, dairy and packing plant products. There are large oil wells in the district. The Missouri River here drops 365 ft. in 8 miles; there are 3 dams which provide 165,000 horse power. Pop. 28,822.

Great Fish Bay, an inlet of the Atlantic in Portuguese W. Africa, 20 m. long.

Great Fish River: (1) In Cape of Good Hope, rises in the Sneeuwbergen Mts., and enters the Indian Ocean after a course of 230 m. It is only navigable for small boats owing to the bar at its mouth. (2) Or **Back River**, in Canada, rises close to Lake Aylmer and flows into the Arctic Ocean. It has a wide estuary, and Montreal Island stands at its mouth, where relics of Sir John Franklin's expedition were discovered.

Great Grimsby, see GRIMSBY.

Great Harwood, an urban dist. in the Darwen parl. div. of Lancashire, about 3 m. from Accrington. There are collieries in the vicinity, and the manufacture of cotton is carried on. Pop. 13,605.

Greathead, James Henry (1844-96), a British engineer, b. at Grahams-town in Cape Colony. He migrated to England in 1859, and became a pupil of Barlow, from whom he learned the shield system of tunnelling which he made use of in the construction of the Thames Tunnel. After this he devoted his time to the improvement of his 'shield,' and it was used in the tunnelling of the tube railway, now known as the City and South London. He was also engaged on the Waterloo and City, and the Central London Railways.

Great Kanawha, a river of N. Carolina, Virginia, and W. Virginia, U.S.A. Rising in the Blue Ridge, N. Carolina, in its upper course it is called the New R. The direction of its course is generally N.W., through ranges of the Alleghenies and along valleys, having a course of over 450 m., while the area of its basin is 10,800 sq. m. It eventually enters the Ohio at Mt. Pleasant,

Mason co., W. Virginia, and is navigable for about 100 m. from its mouth.

Great Lakes, The, the fresh-water inland seas of Lakes Superior, Michigan, Huron, St. Clair, Erie, and Ontario, lying between Canada and the U.S.A. They are drained by the St. Lawrence, which flows into the Atlantic, and are navigable for large vessels from the head of Lake Superior to Buffalo, at the foot of Lake Erie, a distance of 1024 m. The greatest area of the lakes is 98,500 sq. m. and they contain, it is estimated, one half of the fresh water upon the earth's surface. Their elevation varies from 600 ft. (Lake Superior) to 250 ft. in Lake Ontario. Between Lake Superior and Lake Huron is the St. Mary's River, navigable for all its length except for a distance of $\frac{1}{2}$ m., during which the level drops 22 ft. Two canals, a Canadian and a United States, have been constructed to circumvent this obstruction, which between them give passage to a greater number of ships than does the Suez Canal. The Canadian Sault Ste.-Marie canal is about 14 miles in length and 150 ft. broad, and has one lock, 900 ft. by 50 ft., which is emptied and filled by electric power. Lake Michigan, which lies entirely in the U.S.A., Lake Huron, Lake St. Clair and Lake Erie are accessible to each other without the use of canals, but the last two, being very shallow, require constant dredging to keep a sufficiently deep channel open. The R. St. Clair connects Huron and St. Clair, the smallest lake, and the Detroit R. connects St. Clair to Erie. Between Lake Erie and Lake Ontario is the Niagara R., 33 m. in length, which has a drop of 326 ft. The new Welland Ship Canal (g.v.) overcomes this by a series of seven locks, each with a lift of 46½ ft. Each lock is 820 ft. by 80 ft. and has a depth of 30 ft. At Port Colborne, on Lake Erie, there is also a guard lock, the longest in the world, being 1380 ft. by 80 ft. The difference of level between Lake Ontario and Montreal along the St. Lawrence is overcome by a series of nine canals, with a length of 42 m. By means of these canals the whole chain of lakes, from Port William on Superior to Kingston on Ontario, and so down the St. Lawrence to the Atlantic, is navigable to vessels of moderate draught. The lakes are ice-bound for some five months of the year, but for the remainder of the time are thronged by both freight and passenger steamers. Around Lake Michigan and W. of Lake Superior are great grain-growing lands, and the grain-carrying trade on the Lakes is

enormous. Both N. and S. of Lake Superior are lands rich in iron; silver, copper, zinc and gold are also found around its shores. Lead, nickel, zinc, copper and silver are found also to the N. of Lake Huron, and these two lakes have on their Canadian shores rich forest lands that have given rise to an enormous pulp-wood industry. Large coalfields are found S. of Lake Erie, and on its N. and E. shores is found a natural gas used for fuel and light. The Niagara Falls, which account for much of the drop in level on the Niagara R., are a valuable source of electric power, both to the U.S.A. and to Canada, the Canadian power plant installed there having a capacity of 522,790 h. p. The lakes are rich in fish of commercial value, whitefish, trout and herrings being caught in abundance. Pike, pickerel, bass, sturgeon, carp, perch and eels are also found in different localities. The chief ports on the Great Lakes are Fort William, Port Colborne, Hamilton, Toronto and Kingston in Canada, and Duluth, Chicago, Detroit, Cleveland and Buffalo in the U.S.A.

Great Northern, The, a company which, prior to the post-war railway amalgamations, formed, with the North-Eastern and North British lines the 'East Coast' express route between England and Scotland. It was started in 1846, and owed its origin to the amalgamation of the London and York and Direct Northern Railways. See L.N.E.R.

Great Northern Railway of Ireland, one of the principal Irish railroads, including the Dublin and Belfast Junction and the Ulster Railway (one of the oldest in the British Isles, opened 1839). The Dublin and Drogheda Railway was also amalgamated in 1875, four other lines being added the next year, and the whole being known as the Great Northern Railway of Ireland. It is conducted by methods closely resembling those of English railroads. The total length is about 700 m., and like most Irish railroads it has a gauge of 5 ft. 3 in. It serves the N. half of Leinster and much of Ulster. The main lines run from Dublin to Belfast; branches connect with Londonderry and Donegal via Armagh, Enniskillen, and Omagh. There are also branches to Dundalk, Drogheda, Navan, and Oldcastle from Dublin, and to Lisbon, Killybegs, and Ballyshannon from Belfast and Donegal. The Great Northern is half owner of the County Donegal Joint Railway. The head office is at Dublin.

Great Northern Railway Co. of the U.S.A. is the most northerly of the great transcontinental routes within U.S.A. territory. Its eastern terminus

is St. Paul, which lies over 400 rail miles north-west of Chicago. By the G.N.R. Seattle on Puget Sound is distant westward from St. Paul some 18,020 miles. The total mileage worked by this great railroad is in the vicinity of 8300 miles. Its freight traffic in that part of its system adjacent to the Great Lakes is very large, as this neighbourhood supports the greatest wheat traffic in the world. One of the unpleasant facts which the administrators of the great transcontinental lines in America have to face is that practically the whole directional tendency of freight traffic is to the western seaboard, comparatively little moving in the reverse direction. The Co. is well and generously equipped with locomotives, passenger and freight cars. Like most of the railway cos. in different parts of the world it has felt the pressure from other forms of transport during the past decade and is now directly interested in transportation by road as distinct from rail-road vehicles.

Great Orme Head, a limestone headland of Wales, situated on the E. side of Conway Bay, N.E. Carnarvonshire. There are interesting ruins and a $5\frac{1}{2}$ m. marine drive. It has a lighthouse with acetylene illumination, and lenses rotated by a gas-pump; the duration of lighting is controlled by a sun-valve, and a pilot-jet re-ignites the main burner at sunset.

Greatakrakes, Valentine (c. 1629-83), the 'touch doctor,' b. in co. Waterford, Ireland. He served as a soldier for some years, and was also for a time a magistrate. He believed himself to have the gift of curing the king's evil, and in 1666 published a *Brief Account* of himself and his cures.

Great Rift Valleys, a depression stretching from Palestine to Central Africa. These rift valleys have their origin in the valleys of the Jordan and Dead Sea, extend through the Red Sea, and across Fr. Somaliland and Abyssinia to Lake Rudolf. They then divide, one branch extending in a southerly direction through Lake Man-yara, the other in a westerly direction through the Albert Nyanza, and then taking a southerly course to Lake Tanganyika. These valleys are parallel cracks in the earth's crust, and in Central Africa have walls between 4000 and 5000 ft. above sea-level.

Great Salt Lake, in Utah, U.S.A., is 80 m. long and 32 m. broad, and has an area of from 2000 to 3000 sq. m. It lies 4218 ft. above sea-level, and is situated in the E. part of the Great Basin near the foot of the Wasatch Mts. The lake is from 10 to 50 ft. deep, but its depth, like its area, changes greatly. It is fed by the

Bear, Ogden, Weber, and Jordan rivers, all of which are too small for navigation, but the lake has no outlet. Its waters contain chloride of sodium, chloride of magnesia, and sulphate of soda to a large extent, and the lake is a popular bathing resort; indeed, owing to the greatness of the specific gravity of the water the human body will not sink in it. The manufacture of salt is an important industry. Glauber's salt occurs in large quantities in some parts of the lake. Antelope Is., the largest island, is 18 m. long.

Great Seal of England, *see* SEAL.

Great Slave Lake, a large lake in Canada, in the North-West Territories, about 300 m. long and 60 m. wide. It has an area of 10,000 sq. m., and forms two large bays, McLeod's Bay in the N. and Christie's Bay in the S. It is connected with Artillery Lake, Clinton-Golden Lake, and Aylmer Lake, and the Mackenzie R. flows out from it on the W. It contains trout, salmon, and other fish.

Great Southern Railway of Ireland, one of the longest railways of Ireland, 1121 m. (1913). Originally established in 1844 to connect Dublin and Cashel, it now serves the S. of Leinster, all Munster, and part of Connaught. Branches connect with Cork, Waterford, Limerick, and Sligo. The new G.S.R., comprising all the companies in the Irish Free State except the Great Northern Railway (Ireland), came into operation in 1925.

Great War, The. For the history of the Great War and its causes, *see* WAR, THE GREAT; and for detailed reference to European diplomacy and policy both during and after the war, *see* also under EUROPE. For detailed military operations *see* FRANCE AND FLANDERS, GREAT WAR CAMPAIGN IN; GALLIOLI CAMPAIGN; ITALIAN FRONT, GREAT WAR CAMPAIGN ON; MACEDONIAN CAMPAIGN (GREAT WAR); MESOPOTAMIAN CAMPAIGN (GREAT WAR); PALESTINE CAMPAIGN (GREAT WAR); RUMANIAN FRONT, GREAT WAR CAMPAIGN ON; RUSSIAN FRONT, GREAT WAR CAMPAIGN ON; AFRICA, GERMAN EAST, CAMPAIGN IN (GREAT WAR); AFRICA, SOUTH-WEST — *Great War Campaign*; etc., etc. For accounts of principal battles and sieges *see* also under the various names, AISNE; AMIENS; ANTWERP; ARGONNE; CAMBRAI; CATEAU, LE; KUT-AL-AMARA; SOMME; VERDUN; YPRES, etc., etc. For naval operations, generally, *see* WAR, THE GREAT, *Sovereignty of the Seas*, and *passim*; and for accounts of principal battles, engagements or operations in detail, *see* DARDANELLES; CORONEL, BATTLE OF; FALKLAND ISLANDS, BATTLE OF; JUTLAND, BATTLE OF VINDICTIVE;

ZEEBRUGGE; etc., etc. For peace treaty provisions *see* under the names of the various treaties, a list of which is given under PEACE TREATIES (GREAT WAR).

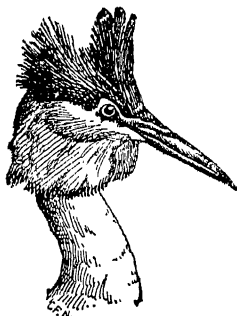
Great Western Railway, one of the first built of our lines, was opened from London to Bristol in 1841 at a cost of about five millions. It stretches from London to Bristol, goes down to Weymouth, and has a boat-service to the Channel Is. It also goes to Devonshire and Cornwall, striking away to Barnstaple on the W. to Exeter and Torquay in the S., on to Plymouth, Falmouth, and Penzance, and by boat to the flower-growing Isles of Scilly. The great line, too, makes its way N. to Gloucester, Birmingham, Chester, Liverpool, and Manchester, and runs through S. Wales from Newport to Milford. The G.W.R. has always been active and enterprising, and even in its early days people always journeyed in comfort in the roomy carriages; and, in spite of the broad-gauge line, the trains travelled at a good speed. An express ran from Paddington to Didcot, a distance of 53 m., in forty-eight minutes. The broad-gauge was abandoned in 1892, and the G.W.R. now holds the record for the longest run without stopping. The Plymouth Express goes from Paddington to Plymouth, a distance of 246 m., at the rate of 55 m. per hour.

Greaves, *see* ARMOUR.

Greaves, John (1602–52), an English mathematician, b. in Hampshire. He was educated at Balliol College, Oxford, and in 1630 was appointed professor of geometry in Gresham College, London. He was a great traveller, and visited Egypt in 1637 and made a very accurate survey of the Pyramids, of which he published a description in 1646. He also collected manuscripts, especially those relating to astronomy, gems, medals, and other remains of antiquity. In 1643 he was appointed to the Savilian professorship of astronomy at Oxford, but was expelled from both this and the post at Gresham College in 1648 because he was a royalist.

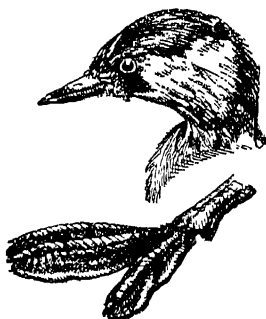
Grebes, diving birds (Pygopodes) which usually frequent rivers and fresh-water lakes in the summer and the sea in the winter. They have broad, flat feet, and the toes are lobed and bear separate membranes which are only joined at the base. The wings are short and rounded and there is practically no tail. The legs are placed far back and the birds stand upright like the penguins. The best-known British species is the Little G. or Dabchick, which is found also in Scotland and Ireland. The Great Crested G., the Red-necked G.,

the Horned G., and Black-necked G. are also found at definite seasons of



HEAD OF GREAT CRESTED GREBE

the year. G. are useful for their plumage, but are so timid that they are extremely difficult to catch.



HEAD AND FOOT OF LITTLE GREBE

Grecian Architecture, see ARCHITECTURE—Greece.

Greece, a European republic situated in the S. extremity of the Balkan Peninsula. The Gks. of classical times called themselves Hellenes, and their country Hellas. But the appellation Hellenes, designating the inhabitants of the peninsula as opposed to Barbarians in general, is of a comparatively late origin. In the Homeric epics the Hellenes are a people of Phthiotis in S. Thessaly. The names Græci and Græcia, as universal names for the people and country of G., were solely used by the Romans, who extended to the whole country the name of the first tribe they

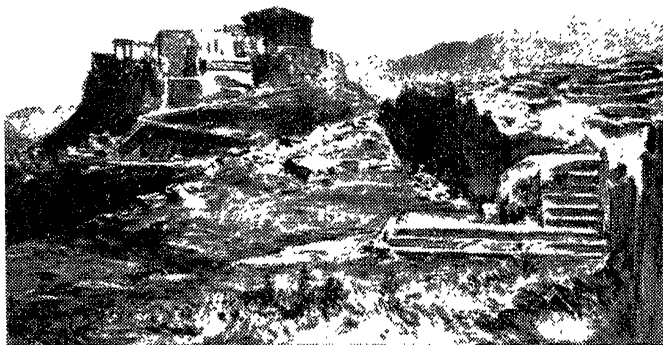
encountered on the Gk. mainland—the inhabitants of Dodona in Epirus. In its widest and loosest application, Hellas signified in anct. times the abode of the Hellenes, and thus embraced mainland and colonies alike. More specifically, Hellas was the land which, prior to the Macedonian conquests, lay S. of the Cambunian and Ceraunian Mts., and included the following districts: Epirus, Thessalia, Acarnania, Ætolia, Doris, Locris, Phocis, Boeotia, Attica, and Megaris (in N. G.), and Corinthia, Sicyonia, Phliasia, Achaia, Elis, Messenia, Laconia, Cynuria, Argolis, and Arcadia (in S. G.). The demarcation of the frontiers of the modern state has been provocative of fierce and protracted contention. In July 1832, by the settlement concluded at Constantinople between Great Britain, France, Russia, and Turkey, the N. boundary line of G. was drawn from the Gulf of Arta to the Gulf of Volo. The Cyclades, the island of Eubœa, and the N. Sporades were included in the kingdom. Great Britain ceded the Ionian Islands in 1864. The proposal of the Berlin Conference in 1880 to transfer to G. Thessaly and S. Epirus was rejected by the Turks. In 1881 the boundary line was drawn from Platamona to Mts. Kritiri and Zygos, whence it followed the R. Arta to its mouth. A slight readjustment of the boundary was effected in 1897, by which G. ceded to Turkey about 578 sq. m. of her N. frontier lands. G. in 1912 had an area of 25,223 sq. m., consisting of continental G. and the Peloponnesus, Eubœa, and the Ægean Islands, the Cyclades and the Sporades, and the Ionian Islands of Corfu, Zante, etc. The pop. of this area (1920) was 2,800,164. The Balkan Wars, 1912–3, gave G. Macedonia, Epirus, and the Ægean Islands of Crete, Mytilene, Samos, and Chios. The area of the new territory was 20,617 sq. m. and the pop. 2,646,913. The total pop. on Gk. territory is (1920) 5,447,077, official estimate (1928) being 6,204,684. The pop. of Athens is 453,000, of Salonika 236,000, and of the Piræus 251,000. A free zone in the harbour of Salonika was in 1923 ceded to Yugoslavia for fifty years. Bulgaria was also given an outlet in the Ægean at the port of Kavalla, joined to Bulgaria by a corridor under the supervision of the League of Nations.

Physical features.—The character of the Hellenic race and the influence which it has exerted on the world's history have been conditioned to a great extent by the geographical configuration of the land, and its singular endowments. Occupying the most central position of the anct. world,

G. enjoyed facile communication with the Orient and Occident. The islands of the Ægean and Ionian Seas were stepping-stones to maritime enterprise. Broken by innumerable harbours, creeks, and bays, the coastline is phenomenal, its total length being out of all proportion to the area of the interior. The determining feature of the country is the mountain system. The great Pindus chain forms the backbone of N. G., and its ramifications interlace the whole area. The mountains of Morea (Peloponnesus) are an independent system, and radiate in all directions from the central plateau of Arcadia. It is

Climate.—The mountains have also important effects on the climate, tempering the vehemence of the S. sun and aerating the country with refreshing breezes. The exceptional variety in elevation also effects rapid transitions from heat to cold. Spring in G. is a season of short duration. The Etesian winds blow steadily in early summer, but these delightful breezes are replaced later by the inclement blasts of the Sirocco. Autumn is humid and unhealthy, and accompanied in low-lying districts by visitations of malarial fever. Winter is crisp and temperate.

Flora.—The flora of G. is not so



THE REMAINS OF THE PNYX OR PEOPLE'S ASSEMBLY AT ATHENS, WITH THE ACROPOLIS AND HYMETTUS IN THE DISTANCE

the partial submergence of these mountain systems that has produced the deep indentations of the coastline of G. and the fringes of systematically grouped islands. The basis of these mountains is hard limestone, hence the precision of outline and the parallelism of the ridges. The nature of the drainage system is peculiar owing to the unique character of the mountain system. The course of the rivers is short and torrential, and only the longer streams, such as the Alpheus, Peneios, and Sphæreus, possess a perennial water supply. No river of G. is navigable. The mountains closely hem in the lake basins, from which the waters find no outlet, except by subterranean passages. G. in her early history was subject to severe volcanic action. In modern times visitations of earthquakes are frequent.

exuberant and varied as that of Italy and Syria. The geological structure, of which limestone and metamorphic marbles are the predominating features, is not favourable to rich vegetation. Four zones are usually recognised: (1) Below 1500 ft., olives, cypress, myrtle, oranges, dates, almonds, figs, poplar, tobacco, cotton, pomegranates, etc.; (2) below 3500 ft. and above 1500 ft., forest zone, oak, chestnut, etc.; (3) below 5500 ft. and above 3500 ft., the region of the beech and pine; (4) above 5500 ft., Alpine zone, small shrubs and mosses.

Industry.—Agriculture is the staple industry of G. The chief products are wine, currants, olive oil, and tobacco. Sheep and goats are pastured in great numbers in the peninsula. Peasant proprietorship predominates. The celebrated mines at Laurion in Attica yield iron, manganese, lead, and zinc.

Other mining products are magnesite, lignite, sulphur, alum, emery, and baryta. Marble is found in Paros, Attica, Thessaly, and the Cyclades.

Financial Conditions.—At the beginning of its independent existence G. carried a heavy debt. A loan was floated in 1833 to establish the new kingdom, but from 1833 to 1862 G. was barely able to meet the interest on this debt and on those contracted during the War of Independence. Foreign creditors endeavoured to secure the intervention of their govts., and after the war of 1897 foreign govts. were compelled to intervene to secure payment for their bondholders in priority to the payment of the Gk. indemnity to Turkey. Great Britain, Russia, and France guaranteed an indemnity loan to enable G. to pay Turkey, but G. was forced to submit to a Six-Power control of her finances. A financial commission with delegates from six Powers was set up at Athens, and their authority was a limitation upon the powers of the Gk. Minister of Finance. The Commission still exists, although only Great Britain, France, and Italy are now represented, and Venizelos has suggested its replacement by a League of Nations Commission to govern the interests of foreign bondholders. From 1910 to 1913, under the administration of Venizelos, Gk. revenues increased by one third. Moreover, the proportion of the National Debt held by Gks. increased from about two-fifths in 1917 to more than half in 1920. The old tax system which showed Turkish influence was abolished. There were formerly about fifty kinds of direct taxes. Venizelos reduced these to thirty-three, at the same time adding four new taxes: on income, on unearned increment of improved property, on legacies, and on war profits. In 1918 uniformity of taxation was secured. The participation of G. in the Great War and the subsequent war between G. and Turkey proved a heavy strain on Gk. resources, and a period of inflation caused the value of the drachma to decline until it reached the figure of 480 to the pound sterling. In 1924 an Economic Commission was set up and proposed economies to the extent of 20 per cent. of the expenditure of the previous budget. The financial problems of G. were aggravated by the return of Gk. refugees from Asia Minor. To meet the cost of repatriating the refugees a loan of £12,000,000 was concluded with the League of Nations. The military dictator, Pangalos, was deposed from power in 1926, and a new Coalition gov., of which Cafandarlis was Finance Minister, made strenuous efforts to

balance the budget by cutting down expenditure and introducing fresh taxes. The League of Nations approved a further loan for the purpose of stabilising the currency and settling refugees. In 1927 a forty-year loan of \$15,000,000 was floated in New York, while a \$2,000,000 loan was also floated in Switzerland and a £4,000,000 loan in England, Italy, and Sweden. The drachma was stabilised, and as one of the conditions stipulated by the League of Nations had been the inauguration of a central independent bank, the Bank of G. was organised in 1927, having the exclusive privilege of issuing bank notes. The same year the war debt to Great Britain was funded at £21,000,000 and that to the U.S.A. at \$20,000,000. The budget estimates since 1925 have averaged at over 9,000,000,000 drachmai, figures for 1930-1 being, revenue 10,534,378,000 drachmai, expenditure 10,525,653,000 drachmai. Of the expenditure about 25 per cent. is in the service of the public debt, which amounts to some 39,000,000,000 drachmai (1929).

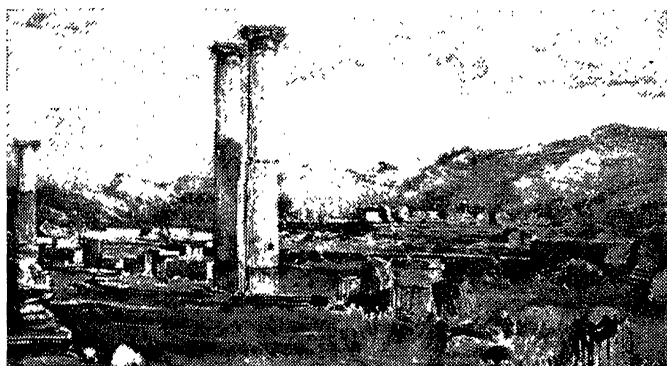
History.—According to the Gk. historians the earliest inhabitants of Hellas were the so-called Pelasgians, but the information afforded by the ancts. on the subject is scant and vague. There is mention of the name Pelasgian in Homer, but it appears to be merely a tribal name designating the inhabitants of Thessaly, Epirus, and Crete. For our knowledge of the inhabitants and civilisation of prehistoric G., we are therefore dependent on the more certain witness of archaeology, and in recent years Gk. archaeological evidence has been supplemented to a remarkable extent. Excavations at Cnossus in Crete have revealed to us the civilisation of the Minoan age of Gk. history. This civilisation is the oldest of which we have knowledge. It flourished about 2000 B.C. Prehistoric Cnossus was a city of massive structure in which the fine arts flourished and had reached a remarkably high stage of development (specimens of Minoan pottery are of exceptional beauty and grace) and in which the art of writing was known. This last fact is of great importance as until recently the art of writing in G. was supposed to be post-Homeric. The next age of Gk. civilisation on which archaeology has concentrated its searching light is the Mycenaean (fl. c. 1600-1100 B.C.). The Mycenaean civilisation is revealed to us by excavations in the sites of Mycenae, Tiryns, etc. The characteristic feature of these splendid cities is their massiveness and solidity. Pausanias relates that tradition attributed the building of Tiryns and

Mycenae to the Cyclopes (hence the expression 'Cyclopean walls' used to denote structures of this massive type), thus testifying to the gigantic edifices of prehistoric times as contrasted with the masonry of a later date. The jewellery, pottery, and weapons excavated from these anct. cities are of rare beauty. Iron was practically unknown in the Mycenaean age. Its use is more extensive in the Homeric age, and therefore Homeric civilisation is probably post-Mycenaean. But vast invasions swept over G., and a ruder civilisation displaced this early culture. In the latter half of the eleventh century B.C. the Dorians ravaged G. They were a coarser, hardier stock than the peoples they conquered, but they brought to G. a new vigour and a new robustness, which when toned and harmonised by the finer influences of the land produced that civilisation which is the world's marvel for all time. These great migrations which swept over G. created a congestion of the pop. which was eventually relieved by widespread colonisation. The Aeolian migrations established settlements in Lesbos, Tenedos, and the Mysian mainland. The Ionian migrations from N. Peloponnesus colonised Chios, Samos, the Cyclades, and the centre of the Lydian coast of Asia Minor. The Dorians also enlarged their frontiers and occupied Crete, Melos, Rhodes, Cos, etc. During the eighth and seventh centuries B.C. great changes took place in Gk. civilisation. Various communities became federalised and some states (notably Athens and Sparta) began to exert a formidable supremacy over neighbouring states. Religious union found expression in the institution of *Amphictyons*, national games (e.g. the Olympian), and the pan-Hellenic dictatorship of the Oracles. Gk. commerce began to outrival Phoenician enterprise. In maritime activity the Corinthians were the foremost state. The Aegean system of weights and measures was adopted, and the coinage of money was introduced from Lydia, two epoch-making innovations which are attributed to Pherdon, King of Argos (c. 748 B.C.). During this period monarchies were displaced in most states by oligarchies, which again were displaced by tyrannies. The constitution of Sparta developed by a unique process: it continued to be a monarchy but subordinated all interests to militarism. In the sixth century B.C. the waves of commercial and intellectual development among the Ionians reached its zenith and quickly receded. In the Gk. mainland new economic evils appeared.

The quick development of mercantile activity caused a violent displacement of occupations, and debtors suffered enslavement. As champions of these debtors the tyrants in most states first established their power. Thus, in Athens, Solon attempted to alleviate the distress of the citizens by his famous legislation (594-593 B.C.), but the real object of his life-work (the confirmation of the political freedom of the Athenians) was reversed when his relative, Peisistratus, just ruler though he was, established himself tyrant of Athens (561 B.C.). In 514 B.C., however, Harmodius and Aristogeiton freed the city of tyrant sway. Cleisthenes in 507 B.C., by an equable distribution of the people in tribes for voting purposes, paved the way for the great Athenian democracy. The fifth century B.C. was the most momentous period of Gk. history, for during this period the East came into decisive conflict with the West for the dominion of the anct. world. At the beginning of the century the Ionians revolted from the 'Great King', Darius. This ill-organised revolt resulted in the destruction of Miletus and the subjection of the Asiatic Gks. by the Persians. Athens, being an Ionian city, had sent aid to her trans-Aegean kinsmen, and Darius resolved to punish Gk. interference and make an example of the Athenian state. The Persian army destroyed Naxos and Eretria, but landing in Attica the ill-armed, ill-organised hosts of barbarians were no match for the little band of finely trained Attic hoplites, and the plain of Marathon was strewn with the Persian hosts (490 B.C.). The palm of victory was won for Athens by the genius of her leader, Miltiades. Darius heard with consternation of the annihilation of his vast army. In the midst of his preparations for a second invasion the great king was cut off (485 B.C.). But Xerxes, his son, mustered soldiery from all parts of his extensive dominions, and the combined forces of the East were arrayed once more against the West. The overwhelming numbers of the barbarians terrified the Thessalians, Locrians, and Boeotians into offering earth and water as tokens of submission; but Athens and Sparta stood firm. A small force under Leonidas, King of Sparta, was despatched to guard the Pass of Thermopylae, and kept the countless hosts at bay till, through the treachery of the miscreant Ephialtes, the little body of Spartans was surprised from the rear and was slaughtered to a man (480 B.C.). But it was the genius of Themistocles that

saved G. and inspired Athens to seek her own safety and the safety of her country in her fleet. In the narrow Strait of Salamis the Gk. fleet encountered the unwieldy ships of the Persians, and the defeat of the barbarians was so severe that Xerxes resolved to quit G., leaving Mardonius, his captain, to complete the campaign (480 B.C.). In the spring of 479 the Persians devastated Attica and razed Athens, but suffered decisive defeat at Plataea. In the summer of the same year the united fleets of Athens and Sparta destroyed the remnant of the Asiatic fleet at Mycale. Thus, by the sustained courage of Sparta and the altruistic intrepidity of the Athenians by land and by sea the powers of the East were broken. By this war, as

combined fleet. The formation of this allegiance was the nucleus of the Athenian empire. Sparta, meantime, still retained her position as leader of the Peloponnesian confederacy. Thus the Gk. powers united by the common danger of the Persian invasion became divided through the antagonism of the rival confederacies for the supremacy. Within the city of Athens the tides of democracy were rising fast. Themistocles was the champion of this popular movement, first organised by the genius of Cleisthenes. The mantle of Cleisthenes had then fallen on the shoulders of Ephialtes, who diminished the anct. prestige of the Areopagus, the pillar of aristocracy. By the policy of Pericles this dictatorial court was



THE SACRED PLAIN OF OLYMPIA WITH THE COLUMNS OF THE PALÆSTRA IN THE FOREGROUND

never before, G. earned her own potentialities, and her several states were forced to combine and recognise their true unity. The example of high moral calibre exhibited by the Gk. leaders during the war became a great inspiration in the art and politics of G. The Gks. having expelled the Persian invaders, freed their kinsmen across the Ægean from subjugation to Persia, and received them into alliance. Pausanias, the Spartan victor of Plataea, at first commanded the combined fleets, but his defection to 'Medism' aroused distrust and suspicion, and the command passed into the hands of the Athenians. In 477 B.C. Athens formed the Delian League, and the treasury of the allies was kept at Delos. The cities of the league were required to furnish ships or the equivalent in money towards the maintenance of the

robbed of all but nominal powers. By the removal of the confederate treasury to Athens and the appropriation of the funds for civic purposes, the relation of the Athenians towards their allies became avowedly autocratic. By the five years' peace (451 B.C.) and the thirty years' peace (446 B.C.) an attempt was made to defer the inevitable war with Sparta, but the peace policy miscarried and the conflagration burst forth in 431 B.C. During the period immediately preceding the war, when the reins of government were in the hands of Pericles, Athens reached the zenith of her literary and artistic glory. In the galaxy of great names, Æschylus, Sophocles, Euripides, Cratinus, Aristophanes, Pindar, and Phœdias shine supreme. The city beautiful was a veritable haunt of the Muses. The Peloponnesian War

was not merely a decisive duel between two rival cities, it became a racial conflict between Ionians and Dorians, and a political conflict between democratic and oligarchic principles. It drained G. of her resources and left her weak and spiritless, an easy prey to the uncorrupted vigour of the barbarians. The war raged from 431 B.C. to 404 B.C. and terminated in the destruction of Athens. The chief causes which brought about the final disaster were the unscrupulousness and temerity of the popular leaders, among whom Alcibiades was chief offender, the Quixotic scheme of the Sicilian empire which resulted in the destruction of the Athenian armament, and the exhausting intestine strife which reached a climax in the outrages of the Four Hundred. The final victory of Sparta was due to an ignominious and traitorous allegiance with the Persian Cyrus. The destruction of the Long Walls of Athens and the surrender of her fleet (404 B.C.) were the final throes of her tragic fall. It was as champion of Gk. freedom against the despotic presumptions of the 'tyrant' city that Sparta had won the confidence of her allies, but when, at the close of the war, she devoted her victory to private aggrandisement, the forces of disintegration began to act. A combination was formed during the succeeding decade to lay the power of Sparta low, but the efforts of the hostile coalition were abortive, in spite of assistance from the Persians, who overthrew Spartan naval supremacy at Cnidus (394 B.C.). Sparta, however, once more enlisted Persia among her supporters, and by the peace of Antalcidas became the supreme land power in G. But the price of the peace was the surrender of the cities on the Asiatic coast. The dominion, however, of Sparta was not destined to stand for long. Thebes suddenly, under her dauntless leader Epaminondas, confronted the Gk. powers and irrevocably destroyed the Spartan supremacy at Leuctra (371 B.C.). The subversion of Sparta's ascendancy was a fatal blow to the oligarchic govts. of Greece, and democracies were re-established in many states. By the restoration of the Messenians Epaminondas further incapacitated Sparta. The domination of Thebes was for the moment indisputable, invincible. But the death of Epaminondas on the field of Mantinea (362 B.C.) left Thebes without a leader and opened the gates for the Macedonian invaders. Philip, King of Macedon, a barbarian, fired with the ideals of Hellenism and a staunch believer in militarism, having organised an army on his

own 'phalanx' scheme, awaited an opportunity to interfere in the domestic variances of the rival Gk. powers. As the champion of the Delphic cause, he devastated Thessaly, sacked Olynthus, and overran Phocis. Bribing here, subduing there, he gradually won over the Gk. states, and even the eloquence of Demosthenes could not avail to arrest the victor's progress. In 338 B.C. the victory of Chaeronea made Philip the indisputable master of G. It is a strange irony of events that the unity of G., which the great Grecian powers, Athens, Sparta, and Thebes, had spilled their life-blood to create, was only realised by the sword of a semi-barbarian king, and at a time when the glory of the country's prime had irredeemably departed. As G. was exhausted as a field of military enterprise, Alexander, son and successor of Philip, resolved to devote his indefatigable energies to the conquest of the East. Having made an example of the recalcitrant of Thebes, the Macedonian turned his back on G. and conquered the great Persian empire. He then penetrated into the heart of India, spreading effectually the language and civilisation of the Gks. over the conquered lands. His schemes were gigantic. He intended to follow up the subjugation of the East with the conquest of Italy, Carthage, and the further powers of the West. But death interrupted his victorious course. He died at Babylon 323 B.C., aged thirty-two. No successor was found competent to shoulder the responsibilities of his Olympian dominions, and his vast empire fell into disintegration. The Gk. states, realising Macedonia's hour of weakness, made several attempts to reassert their independence. The revolt was headed by the Athenians and the Aetolians, but in 322 B.C. the insurgents sustained a decisive defeat at Crannon. Antipator, the Macedonian leader, changed the constitution of Athens to an oligarchy, and disfranchised and deported the poorer classes. Macedonia recovered her prestige under Antigonos Gonatus, who in the Chremonidean War (266-262 B.C.) once more subdued G. in spite of the formidable opposition of Athens and Sparta. The Achaean League, renewed in 281 B.C., became gradually enlarged and consolidated, its main object being the restoration of Gk. independence. Under Aratus, the celebrated Sicyon general, Sicyon and Corinth were persuaded to join the league, which soon became the chief political power in G. But the league, now extending its power over Peloponnesus, came into collision with Sparta. A succession of vic-

tories over the league by Cleomenes, King of Sparta, prompted Aratus to invite Macedonian assistance, and thus the primary object of the combination was defeated. During the Social War the Achean League was assisted by Philip V. of Macedon against the Aetolian League, but the wider interests of both parties at stake in the Second Punic War called for a cessation of hostilities. Philip himself made a treaty with Hannibal (215 B.C.). Rome in revenge sowed seeds of dissension among Philip's Gk. dependencies, and when Zama (202 B.C.) brought the Second Punic War to a satisfactory close, she turned her attention to the Gk. delinquents. Philip's forces were utterly crushed at Cynoscephalae. Peace was made on generous terms, and the freedom of the Gk. cities was proclaimed at the Isthmian games (194 B.C.). At the battle of Pydna (168 B.C.) Aemilius Paulus defeated Persues, King of Macedon, and brought the Macedonian kingdom to an end. In 147 B.C. the Achean League made an abortive attempt to throw off the Rom. yoke, but Metellus defeated the Achaeans at Scarpheia, and Nummius, his successor, made a bitter example of Corinth, dismantling her glorious edifices and transporting her priceless treasures. The Rom. administration in G. was, on the whole, tolerant and beneficial. Gk. ascendancy in thought and letters caused Rome to treat her dependency with exceptional leniency. Peace was, however, broken in 88 B.C. Mithridates, King of Pontus, incited Athens, Achaia, Boeotia, and Laconia to support him against Rome. Archelaus, Mithridates' general, was defeated by Sulla with immense loss at Charonea, and Orchomenos (96 B.C.) and the Gk. cities which conspired against Rome were treated with extreme severity. During the civil war between Caesar and Pompey, the Athenians sided with Pompey, but when Pompey was finally vanquished, Caesar treated his opponents with his characteristic clemency and generosity. Their gratitude was, however, short lived, for Athens affiliated herself to Brutus and Cassius, seeing in Caesar's murderers champions of freedom comparable to her own heroes, Harmodius and Aristogeiton. During the struggle between Octavian and Antony, the Athenians offered their partisanship to Antony, and consequently the victorious Octavian ruled them with a firm hand. Not till the time of Vespasian, however, did the internal administration of Athens suffer fundamentally through

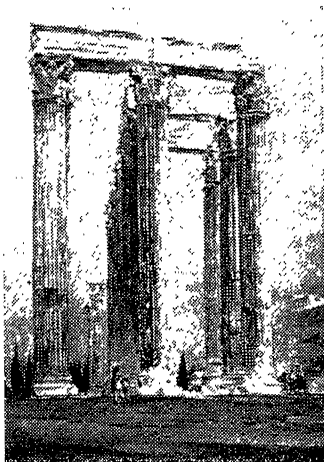
Rom. interferences, but that emperor deprived the Athenians of their gilded show of liberty and brought them under the iron rigidity of Rom. institutions and law. Adrian, however, entertained a warm admiration and affection for the country, and made a generous attempt to restore the glory and splendour to the citadel of the muses and revive its literary and artistic genius. But the work of vandalism had already begun. Incursions of the Goths swept over G., leaving destruction in their train, and the history of the Gk. states becomes as shifting sand. In the thirteenth century Athens fell into the hands of Baldwin. Subsequently it was governed by Delves of the house of Aragon, and at his death it fell into the hands of Bajazet, Emperor of the Turks. It was afterwards held by the Spaniards and the Venetians, but in 1460 the peninsula was entirely subjugated by the Turks. The Venetians invaded G. towards the close of the seventeenth century, recovered Athens from the Turks, and occupied a considerable portion of the mainland and some of the islands. But the Venetian central power was not strong enough to maintain its control, and in 1718 G. passed once more under the Ottoman yoke. Peter the Great projected a campaign to free the oppressed states, but did not live to carry out his schemes. The assistance sent by Catherine was inadequate and ineffectual. The succession of Ali Pasha made the condition of the Gk. people more hopeless than before. In 1814 a society of young Gk. patriots, called the Hetairai, was formed at St. Petersburg. The objects of this society were ostensibly literary but were really political, and it was this society that was largely instrumental in fanning the flames of rebellion throughout G. In 1821 Jusuff Pasha defeated the insurgents at Galatz, and in the same year the sacred battalion, under the dauntless leader, Jordaki, was annihilated. But in the Morea the cause of freedom was attended with greater success. In Sept. 1821, a constitution was formulated by the independent party at Missolonghi, applicable to W. Hellas; later a similar constitution was drafted at Salona, embracing the E. states, and in Dec. the constitution of Peloponnesus was framed. In 1823 a final constitution comprehending the whole of G. was adopted by the National Assembly convened at Astro. But the Ottoman powers made a desperate effort to annul the decrees, and in 1825 an Egyptian army, under

Ibrahim Pasha, was despatched to the Morea. In a few months the work of the patriotic party was all but subverted, and only the combined intervention of European powers rescued the tottering standard of liberty. Ibrahim Pasha haughtily repudiated the claims of the Powers, and the crisis came when, in the decisive battle of Navarino (Oct. 1827), the allies destroyed the Turkish and Egyptian fleet. By the protocol of 1830 G. was declared an independent kingdom and her boundaries were defined. The arrangement was in many respects unsatisfactory; it excluded Acarnania from Gk. territory and a great part of Ætolia and Thessaly; a Turkish barrier interrupted communication between G. and the Ionian Islands, while Candia, Samos, etc., were not comprehended. The liberated state was at first governed by a national assembly, but the president, Count Capo D'Istrias, assumed autocratic powers, and sedition culminated in his assassination. Subsequently the Powers offered the throne of G. to Prince Leopold (afterwards King of Belgium), but the offer was refused. The crown was then given to Otho, son of Louis I. of Bavaria. Throughout his reign discontent was rife, and an insurrection in 1862 resulted in the deposal of the king. George, second son of the King of Denmark, was then chosen king, and the Ionian Islands, at that time under British protection, were ceded unconditionally to the kingdom. By the Berlin Congress of 1878, G. was promised a modification of her frontier, and in 1881 a readjustment was accepted. Thessaly, S. of the N. watershed of the Salambria, was ceded to G. and the tract of land bordered by the Arta R. The allocation proved distasteful to the Hellenes, who demanded Crete, and hostilities commenced with Turkey in 1897. The war was short-lived, and was disastrous to the Gks., and on the intervention of the Powers an armistice was concluded. By the Treaty of Constantinople G. was constrained to pay an indemnity, to submit to the readjustment of her frontier and to accept the control of the Powers in financial affairs. Venizelos came to the fore with the movement in Crete to break away from Turkish rule and unite with G. In May 1910 a Cretan Assembly was set up and Venizelos became President of the Provisional Gov. Later in the year he was elected to the Gk. parliament, and on Oct. 10, 1910, became Premier. He set to work to form a Balkan League strong enough to withstand Turkey. A Serbo-

Bulgarian Treaty was followed by a Græco-Bulgarian Treaty, and in the War of Liberation the strength of the League was proved by the complete collapse of the Turks. (See BALKAN PENINSULA; BALKAN WARS.) On May 30, 1913, Crete was ceded to G. by the Treaty of London, which ended the war between Turkey and the Balkan States. When, however, the alliance was broken by the treachery of Bulgaria, G. received further extensions of territory by the Treaty of Bucharest, which ended the Second Balkan War, but in its settlement ignored all ethnographic facts. In March, 1913, King George of G. had been assassinated in Salonika by a fanatic, and was succeeded by his son, Constantine XII. Venizelos endeavoured to reorganise G. internally, but the coming of the Great War in 1914 proved how short-lived had been the hope of a Balkan settlement. At the beginning of the War G. maintained neutrality, since her alliance with Serbia was directed only against Bulgarian aggression. The Ger. Emperor endeavoured to secure the co-operation of G., but his appeals to King Constantine as a brother-in-law and a Ger. field-marshal failed to move G. from her policy of neutrality. The Gk. Premier, Venizelos, however, was for immediate intervention on the side of the Entente. He offered Gk. aid to the Allies in the event of hostilities from Bulgaria and Turkey, but at that time there were hopes of Turkey remaining neutral. In Jan., 1915, Gk. aid was solicited by Great Britain on behalf of Serbia, and in return for concessions in Asia Minor. G. could not act until the attitude of Bulgaria was assured, and Venizelos attempted to secure a Bulgarian alliance in aid of Serbia by the cession of Kavalla. Constantine did not agree with this policy and was not encouraged by the proposed Gallipoli Campaign (*q.v.*). An attempt to secure the alliance of Rumania in order that Bulgaria might be kept in check failed. The king's refusal to support Venizelos was justified in Gk. eyes by the Allied failure in the Dardanelles and at Gallipoli, a failure which would have ruined G. had she participated. The differences between king and cabinet caused Venizelos to resign on March 6, 1915. Gounaris formed a ministry, and maintained the policy of neutrality with a pro-Entente bias. A General Election was held on June 13, and the Venizelist party won 184 seats out of 314. In Aug. Venizelos returned to power on the understanding that G. would aid Serbia against Bulgarian aggression, but

together with the news on Sept. 21, 1915, of a Turko-Bulgar agreement and a precautionary mobilisation of Bulgarian troops came the fact that Serbia would be unable to afford G. any substantial help in the event of hostilities between G. and Bulgaria. However, G. mobilised and converted her attitude into one of armed neutrality. 150,000 Allied troops were promised, but their landing would constitute a breach of Gk. neutrality as long as G. was not called into the War by Bulgarian aggression against Serbia. On Oct. 2, Bulgarian troops were massed against Serbia, and Venizelos was carrying parliament with him in a vote of confidence in his military policy when he was called upon by the king to resign. The Allied force which landed in Salonica proved to be only 20,000 strong, and the Gks., feeling Venizelos had been duped, discredited his policy. A new ministry was formed by Zaimis, and the armed neutrality was preserved. Zaimis was succeeded by Skouloudis, who in Dec. came to an agreement with the Allies whereby the Gk. gov. guaranteed no hindrance to the military operations in Salonica. (For the campaigns in G. and Macedonia, see under SALONICA and MACEDONIAN FRONT). In April 1916, however, Skouloudis refused to allow the transit of the Serbian army from Corfu to Salonica across Gk. territory. The refusal embroiled France with G., and a loan of 150 million francs was prohibited. Venizelos, who had invited the Allies to G., was discredited, but he returned to parliament as candidate for Mytilene. G. maintained her neutrality with difficulty in the face of Fr. and Ger. pressure. The nation was split between Royalists and Venizelists, and towards the end of 1916 Venizelos set up a Provisional gov. at Salonica with the assistance of Admiral Koundouriotes and Politis. He endeavoured to recruit a Gk. army to aid the Allies in the offensive which General Sarrail was forced to take against the Bulgarians during Aug. In June 1917 France and Great Britain decided to act in their capacity of 'protecting Powers' who had guaranteed to insure the Gk. Constitution. Jonnart, former Governor of Algeria, was despatched to Athens to demand the abdication of Constantine. An ultimatum and a display of force secured this, and on June 12 Constantine abdicated in favour of his second son, Alexander, and quitted G. Zaimis formed a gov. at the invitation of King Alexander, while the Provisional gov. in Salonica ceased to exist.

On June 24, at the instigation of the Fr. Commission, Zaimis resigned, and Venizelos was recalled to power. The former supporters of Constantine were persecuted, and G. definitely entered the War on the side of the Entente. By the Treaty of Sèvres (Aug. 10, 1920) G. was awarded practically all Thrace outside Constantinople and a mandate over Smyrna and the Hinterland. On Oct. 25, 1920, Alexander died from the bite of a monkey, and the elections in the following month, on Nov. 14, resolved themselves into a struggle



THE TEMPLE OF OLYMPIAN ZEUS
AT ATHENS, FROM THE EAST

between the Venizelists and the Constantinians. Venizelos was defeated, and left G. Rhalles became Premier, and a plebiscite favoured the return of Constantine. The result was that in the war between G. and Turkey over the possession of Smyrna (see GRÆCO-TURKISH WAR), G. was deserted by the Powers, France favouring the Turks. G. was forbidden to attack Constantinople, and on Sept. 22, 1922, the Turks captured Smyrna. This was followed on Sept. 27 by the second abdication of Constantine, who retired to Palermo, and on Jan. 11, 1923, he died. The Generals Gonatas and Pangalos became Premier and Minister of War respectively in a 'Revolutionary Gov.' Their chief act—the execution of Hadjianestes, former commander of the forces in Asia Minor, together

with five ex-ministers—brought G. into disgrace. By the Treaty of Lausanne, July 24, 1923, G. lost E. Thrace, the boundary between G. and Turkey being fixed at the Maritza River. Shortly after, on Aug. 27, G. was embroiled with Italy over the murder of General Tellini, Italian delegate, with the other members of the commission investigating the Albanian boundary, while on Gk. soil. Following an Italian ultimatum, Corfu was bombarded, and although the Italians were forced to evacuate Corfu on Sept. 27 by the League of Nations, G. paid a large indemnity. An unsuccessful counter-revolution against the 'Revolutionary Gov.' brought the monarchy into discredit, and King George was asked to leave for Rumania. Venizelos returned and formed a cabinet, which lasted a month. Then again going into exile, he was succeeded as Premier by Papanastasiou. On March 25, 1924, G. was proclaimed a Republic, although the king was allowed to retain his title. Papanastasiou was succeeded in July by Sophoules, who in Oct. was followed by Michalakopoulos, whose long premiership was terminated in June 1925 by the *coup d'état* which made Pangalos dictator. Following the resignation of President Koundouriotis, Pangalos got himself elected in his stead, but by Aug. Pangalos was overthrown and imprisoned, and Koundouriotis returned to take up the presidency again. A Coalition Gov. was set up, with Zaimis as Premier, and on June 2, 1926, after three years of discussion, the Constitution was passed, and since that time, despite the difficulties of political collaboration in a coalition gov., the Republic has endured.

Greek Law.—The first written laws in G. did not appear until the development of the Gk. City States; previously the only existing laws had been a floating body of unwritten 'customary' laws. But by the beginning of the sixth century B.C. every first-class Gk. state, except Sparta, had advanced beyond the stage of unwritten usage.

Owing to the peculiar geographical conformation of the country, Gk. law tended to develop along separate lines in the various states. Consequently there was at no time a 'common law' for G., comparable to the Common Law of England. Although there were many principles common to all the various codes, such as the marriage law and some provisions in the criminal law, their presence is to be attributed to the common stock of ant. Gk. ideas from which all Gk. laws are derived. The

Athenian judicial system as developed under the democracy of the fifth and fourth centuries B.C. stands inevitably in the forefront of Gk. law, both because of its high degree of development and the influence it exerted over the whole Gk. world through the cultural and political supremacy of the Athenian proper. It was Dracon (c. 620 B.C.) who first codified the mass of unwritten laws into what was intended to be a permanent body of law, but the real basis of Athenian law was laid by Solon, during his archonship in 594 B.C. The code of Solon may be said also to have laid the foundations of Athenian democracy by the formulation of the 'isonomia'—equal membership of Assembly and supreme Law Court for all free-born adult males born in Attica. The Peisistratid tyrants preserved the code almost intact, but after their final expulsion Cleisthenes revised it once more, giving it a still further bias towards democracy.

Two main principles govern the complicated structure of Athenian law, both constitutional and civil; first, that all law should be easily intelligible to the ordinary man, and, secondly, that the best guarantee of a pure administration of justice is the common sense and moral instinct of large bodies of ordinary men. For this reason the 'dikastai', or jurymen occupy the most prominent place in the Athenian judicial system. Drawn from the ordinary citizens over thirty years of age not under any civil disqualification, these courts of Dikasts, sometimes reaching 6000 in number, formed both judge and jury; they controlled the appointment and conduct of executions and eventually encroached even upon the sovereign Assembly. Athenian law-suits fall generally under the headings of 'graphai' (public suits) and 'dikai' (private suits). These were always initiated by a private individual, the dikasterion's function being the purely passive act of judging; it was possible, however, to counter-accuse the accuser who brought an illegal action and to penalise him heavily. The Athenian usually conducted his defence in person; many, however, enlisted the services of a Demosthenes or an Isocrates to compose their speeches for them, and many such speeches are still extant. Athenian justice, like other Athenian institutions, soon became decadent; appeals to the emotions of the jury had always been a weakness of the system, and corruption and the practice of paying the jury for their services further degraded the Athenian law-courts. With the Rom.

conquest the Rom. system of law gradually took the place of the Gk. system, which can now only be disinterred with difficulty from the extant speeches and inscriptions.

Greek Language.—The anct. Gk. language belongs to the Indo-European group, and was traditionally divided into the four dialects, Æolic, Doric, Ionic and Attic, roughly in accordance with the different branches of the Hellenic race. Æolic, the dialect of Lesbos, Bœotia and N. Thessaly, has no great literary importance save as the language in which Sappho and Alcaeus wrote. Doric, spoken by the natives of the Peloponnese, Locris, Phocis and the Dorian colonies and islands in the E. and W. Mediterranean, is particularly characterised by the broad 'a' (for 'η') and by a peculiar system of accentuation. It is the dialect of the Gk. choral poetry in general, and is found in the choruses of the Attic tragic writers, as well as in the Sicilian elegies of Theocritus. Ionic, with its sub-dialect Epic, was the language of the earliest Gk. writers extant, historians like Hecateus and Herodotus, the Ionian philosophers, most of the elegiac writers, and above all Homer and the other epic poets. The language of Apollonius Rhodius and other later epic poets is only a scholarly, and sometimes inaccurate, imitation of the original epic sub-dialect. Attic is sometimes regarded as a sub-dialect of the Ionic, with which it agrees in having long 'η' for long 'α' and in contracting *εε* into *ει* and *οο* into *ου*. The digamma F ('ν') has been dropped, as it has, except for the purpose of scansion, in Ionic. As the language of the great Athenian writers, Attic naturally came to supersede all other dialects as the standard of 'correct' classical Gk., through the spreading of Athenian cultural and commercial supremacy throughout the Gk. world, until it became eventually the normal Gk. dialect of the cultured and the basis of modern Gk. Gk., in its various dialects, had already penetrated to Sicily, S. Italy and France, the Spanish coast and all round the E. Mediterranean, when the conquests of Alexander the Great made it the universal *lingua franca*, not only of Asia Minor, but of a good part of the Near East. With the Rom. conquest of the Mediterranean basin the language spread still further, and became the recognised language of polite intercourse in the Rom. world, much as Fr. has been in the society world in recent times. When the W. Rom. empire was submerged beneath the barbarian invasions of the

fifth century A.D. Gk. disappeared from the Western world for a thousand years, but lived on as the official tongue of the E. Byzantine Empire until the fall of Constantinople before the Ottoman Turks in 1453. The immigration of scholars into W. Europe, which then followed, added impetus to a movement already begun in Italy for the revival of Gk. studies, and with the Renaissance Gk. was once more reinstated as a learned tongue, though it never again rivalled the universality of Latin. In G. and the Levant, however, Gk. still lived on as a spoken language, though the passage of time and the intrusion of many Slavonic and Turkish words and forms had wrought radical changes in the old classical tongue. The 'b' sound, for example, has vanished entirely, the letter β now representing a 'v' sound; the grammatical construction has been profoundly modified, particularly in the conjugation of the verb, while the pronunciation of the language has been entirely altered by the conversion of the 'pitch' or 'tonal' accents of classical Gk. into a 'stress' accent. It is significant that the revival of Gk. nationality at the beginning of the nineteenth century was accompanied and aided by an awakened interest in the anct. Gk. tongue, initiated by the great scholar Koraes. This movement took the form of an attempt to restore the purity of the language as far as possible by the removal of foreign words and constructions. As a result it is now possible to distinguish two types of speech in modern G.—the 'demotic' or popular (spoken by the populace at large) and the 'purist' Gk., the official language taught in the schools and written in the newspapers, a conscious imitation of anct. usage purified as far as possible from intruding foreign words. There is no doubt, however, that the latter is steadily gaining ground, and that soon the country will speak no other language. The Gk. alphabet is as follows:—

Letter.	Name.	Pronunciation.
α	alpha	a
β	beta	b (v in modern Gk.)
γ	gamma	g
δ	delta	d
ε	epsilon	e (short)
(F)	digamma	v (disappeared early from the alphabet).
ζ	zeta	z
η	eta	e (long)
θ	theta	th
ι	iota	i
κ	kappa	k
λ	lambda	l

Letter.	Name.	Pronunciation.
μ	mu	m
ν	nu	n
ξ	xi	x
ο	omicron	o (short)
π	pi	p
ρ	rho	r
ς σ	sigma	s
τ	tau	t
υ	upsilon	u
φ	phi	ph
χ	chi	ch
ψ	psi	ps
ω	omega	o (long)

Greek Literature is conveniently divided into six periods, viz.: (1) Early literature, ceasing about 475 B.C., and embracing epic and lyric; (2) Attic literature, ceasing about

unification of loose ballads and folk songs. This branch of literature may be classified as objective and uncritical. Lyric came next in order of development. In theme it is distinguished by subjectiveness and emotional intensity; in form it makes for artificiality and crystallisation. The lyric epoch was followed by the rise of the Gk. drama. The Athenian drama was democratic and individualistic in outlook. In style its tendency was towards naturalness, and thus, while preserving the character of poetry, it assimilated some of the qualities of prose. Lastly, Gk. prose developed; in style it advanced from the accidental rhythms of the early writers to the carefully systematised cadences and metrical graces of the later writers. While



THE STOA OR PORTICO OF THE ATHENIANS AT DELPHI
(Erected 460 B.C. to the honour of Apollo)

300 B.C., and including the development of drama and prose; (3) Alexandrian literature, ceasing about 146 B.C., and producing miscellaneous works of a learned and artificial type; (4) Græco-Rom. literature, ceasing about A.D. 529, and occupied mainly with critical and historical treatises; (5) Byzantine literature, ceasing about A.D. 1453, and yielding principally scholastic works; (6) Modern Gk. literature, excelling chiefly in lyric and ballad.

Gk. literature attained perfection in all its branches without extraneous influence, and therefore its history affords a unique study of the natural order and development of the divers species of poetic and prose composition. The first department of Gk. letters to reach maturity was epic, which arose from selection and

anct. Gk. literature developed in many and divers directions it nevertheless maintained throughout its entire career certain characteristics which reflect the distinctive genius of the Gks. as a nation apart from all other nations. As in her art and in her ethics, the keynote of the literature of G. is beauty and power in restraint. This moderation, which is to be carefully distinguished from mediocrity, is an essential feature of the 'classical spirit.' True Gk. chastity never permitted in artistic conceptions the intrusion of sentimentality, effusiveness, and super-elaboration. There is always perfect harmony and balance in thought and expression, in content and form.

The great epics of G. are the *Iliad* and the *Odyssey*, whose authorship is traditionally attributed to the blind

bard Homer, and which were composed about 900 B.C. In eighteenth-century criticism the unity of the Homeric authorship was called into dispute, and a highly composite authorship was assumed. The limits of this article prohibit a detailed discussion of the Homeric question, and it must suffice to say that the *Iliad* and the *Odyssey* were undoubtedly inspired by the folk songs of the ballad epoch, and that their respective unity of thought and perfection of structure compel us to admit that each must have taken its final form from the magic hand of a great poet. The well-spring of the poems is a cycle of anct. Achæan ballads. The Æolic bards of Asia Minor transfigured and transformed these rude songs, but their final form bears the impress of Ionic genius. The poems are written in hexameter verses, a metre of unknown antiquity, and occurring in most anct. Delphic oracular responses. The so-called 'cyclic poems' continue the epic history. They complete the story of Troy, but are inferior in conception and design in the Homeric epos.

The poems of Hesiod (*N. c.* 735 B.C.), the next great poet in the history of Gk. literature, form a striking contrast in subject and treatment to the Homeric epics. The Homeric heroes seem almost to enjoy participation in the blithe life of the gods; the atmosphere is clear, the prospect luminous. The hand of fate does indeed loom over gods and man, but the inevitable decrees are accepted with calm and unperturbed submission. But in Hesiod the world is rough and rugged, and the heavens are afar off. Nature is a hard task-mistress demanding of man toil unceasing. Hesiod's gospel is veritably a gospel of work. Xenophanes, Parmenides, and Empedocles, the early natural philosophers, continued the tradition of didactic poetry.

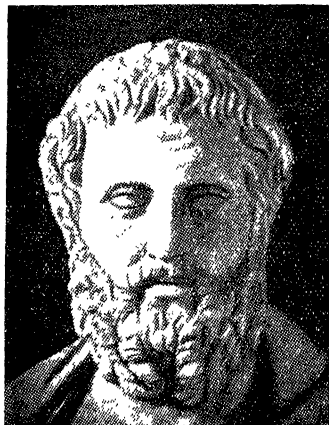
The so-called Homeric hymns do not synchronise with the composition of the *Iliad* and *Odyssey*. They belong to the sixth century, and are probably preludes which were sung by rhapsodists at the recitals of the Homeric epics at the Panathenæa.

Gk. lyric, like Gk. epic and Gk. philosophy, was primarily the inspiration of the Gk. colonists of Asia Minor, the period of colonisation being marked with phenomenal activity in all spheres of thought and action. The chief lyric species were elegiac and iambic. The distinguishing feature of Gk. elegiac verse is its universal range of application. Thus Callinus (690 B.C.) and Tyrtaeus (640 B.C.) adapt it to martial themes, Mimnermus (620

B.C.) to erotic, Solon (600 B.C.) and Theognis (550 B.C.) to gnomic, and Archilochus (690 B.C.) and Simonides (530 B.C.) to funereal. Iambic verse approximates more closely to a colloquial form, and hence is best adapted to a satiric and controversial vein. The instrumental accompaniment which had originally been indispensable to elegiac and iambic verse gradually fell into disuse and melic verse (or verse inseparable from an instrumental accompaniment) was represented by two new orders, viz. Æolian and Dorian. The Æolian mode was monodic and personal; the Dorian was choral and civic. The greatest achievements in Æolian verse were attained by Sappho; her poetry excels in intensity of passion and beauty of melody. Unsurpassed in the Dorian mode is Pindar, whose odes are inimitable in majesty of thought and grandeur of expression.

Tragedy was gradually differentiated from the dithyramb, a triumphant hymn to Dionysus. Arion and Stesichorus are shadowy names in the early history of the dithyrambic chorus, but the name of Thespis brings us to the fringe of history. Thespis first introduced an actor or answerer (*ὑποκριτής*), and thus dialogue between the leader of the chorus and the actor was now effectuated. Phrynichus, author of the historical plays, the *Capture of Miletus* and the *Phœnisce*, employed without alteration the dramatic framework invented by Thespis, and no further innovation was made till the daring genius of Æschylus (*b.* 525 B.C.) startled the Athenian audiences. According to Aristotle (*Poetics*, iv. 13), 'Æschylus first introduced a second actor; he reduced the importance of the chorus and apportioned the principal part in the dialogue.' This new departure, providing two actors in addition to the leader of the chorus, enabled the dialogue to become more complex, for an actor might take more than one rôle. The leading thoughts in the great drama of Æschylus are bold and emphatic. There is a power manifest in the universe which makes for righteousness, and by putting himself in harmony with its tendencies man wins his happiness. Through suffering man learns the will of the gods, but an insolent and overbearing attitude brings sorrow even unto the third and fourth generation. To Sophocles (*b.* 496 B.C.), a younger contemporary of Æschylus, are also ascribed technical improvements in the production and construction of tragedy. Tradition attributes to him the introduction of a third actor, and the invention of scene painting. The motive

idea in the tragedies of Sophocles is less vast than the motive idea in the tragedies of Æschylus. The chief interest in the dramas of Æschylus is in the ultimate and universal problems; the central issue in the dramas of Sophocles is concerned with individual ethics and psychology. In the elder tragedian man is engaged in a titanic struggle with destiny; the religious conceptions of the younger dramatists have ripened to a mellow loveliness. With the third of the great tragic writers of Athens the dramatic atmosphere has quite altered. The sublime elevation and stately repose have vanished before the ferment of moral perplexity and religious doubt. The aim of Euripides is occasional effect



SOPHOCLES

rather than sustained excellence. Emaculate sentiment and tempestuous passion refract the clear rays of spirituality. Instead of the natural being transformed into the supernatural, the supernatural is transformed into the natural. There is discord in the plays of Euripides, a discord between character and environment, between rationalistic thought and mythical setting, between the movement of the plot and the function of the chorus. These are faults of a transition period, for Euripides was too far in advance of his age to harmonise his thoughts with its artistic conventions. But in his humanity Euripides reaches heights undreamed of by his great predecessors. He sympathises with

the slave, the barbarian, and the weak. His portraiture of women is characterised by a tenderness and sympathy that are strangely modern. In the *Alcestis* he abandons the dramatic traditions and introduces lisping children into his tragedy. If the Euripidean drama, as a whole, is unequal, unsymmetrical, there are, nevertheless, passages whose loveliness and beauty are unapproached by anything in Greek literature.

Gk. comedy, like Gk. tragedy, had its origin in the cult of Dionysus. The occasion of harvest thanksgiving gave rise to extempore farces, which in due time took literary shape. Aristotle in the *Poetics* says that comedy sprung from the phallic choruses of these festivals. Such choruses were probably abusive and derisive, and were directed against such personages as were conspicuous enough to excite the interest of the assemblage. The temperament of the Sicilians was especially conducive to the development of comedy, and in Sicily comedy first reached literary excellence and acquired permanent value. Epicharmus of Cos (b. c. 535 B.C.) was the greatest of the early Sicilian comedians. The earlier writers had produced the comedy of situation, but Epicharmus created comedy of plot and character. Political satire is, however, absent from Sicilian comedy, which ridicules the type rather than the man. The chorus is altogether absent. Attic comedy is divided into three divisions: the Old, the Middle, and the New. The Old Comedy flourished from 450 to 390 B.C., and was characterised by broad and undisguised raillery of contemporary events and living personages. It was a product of the political independence and fearlessness of the Athenian democracy. When the democratic constitution of Athens was annulled comedy ceased to be personal. Middle Comedy flourished from 390 to 320 B.C. It satirises movements and factions, but personal satire has practically disappeared. Philosophy, literature, and other contemporary arts are caricatured. In this type of comedy the chorus has practically disappeared. The New Comedy flourished from 320 to 250 B.C. It is distinctly a comedy of manners and character; domestic intrigue takes the place of political situation, and the 'sock' is worn by the man in the street instead of the statesman. Aristophanes far eclipses contemporary writers of the Old Comedy. His belief in the high calling of his art saved him from the grotesqueness and coarseness which before his time seemed inseparable from comedy. He was, above all, a

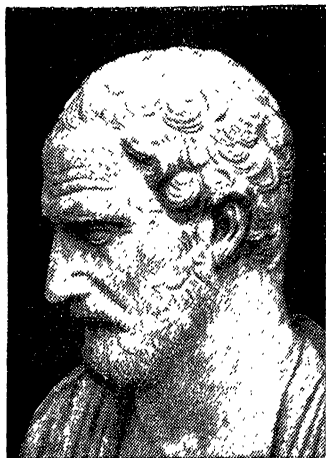
patriot, and it is his pride in the anct. institutions and history of his country that impels him to use his ridicule as a scourge against adventitious experiments and innovations in civil government and morality. Conservative in his ethics, he vehemently attacks the disquieting influence and negative teaching of the Sophists. Socrates' intellectual and philosophical empirics he regarded as a public danger worthy of reprobation and exposure. The charm of his style is unrivalled, except in the Attic idiom of the dialogues of Plato. But Aristophanes is a poet as well as a comedian. Passages of exquisite beauty and sentiment are intermingled with the mockery and the raillery. The gradations of the transition to the Middle Comedy are not clearly defined. In some of the plays of Aristophanes the political licence and overt criticism are already abandoned. Thus in the *Plutus* he discards concrete censorship and adopts symbolical farce. For examples of the New Comedy we were for long dependent on the Latin imitations of Terence, but the recently discovered fragments of Menander now put within our reach a representative body of that dramatist's original work. Menander excels in his delicate delineation of character, the subtle construction of his plot and the consummate chastity of his idiom.

Gk. prose, as is the natural course of things, attained complete development at a much later date than Gk. poetry. The earliest examples of prose in G. belong to the sixth century B.C., and these are chiefly records and chronicles quite unpretentious with regard to style and expression. The Ionian philosophers made considerable advances, but their aim also was mainly didactic, and where style is studied it is in the interests of lucidity. Herodotus, the historian (b. 484 B.C.), is the first conscious prose stylist. The structure of his history is almost dramatic. His inspiration was the momentous drama of the Persian wars. He traces the conflict of the East and West up to its great crisis, marking the intricate chain of cause and effect with insight worthy of an evolutionist, but he abandons the rôle of critical and scientific historian in his acceptance and narration of legends whose value is purely dramatic and artistic. It is the unity of his design and the dramatic graphicness of his narrative that won Herodotus the title of 'the Homer of historians.' In the architecture of his sentences Herodotus adopted the loose style. Thucydides, the next great writer of Gk. history after Herodotus, is a contrast to his

predecessor, both in conception and design. The field of Thucydides' activity is the Peloponnesian War. He wrote when G. was no longer self-assured and buoyant in her national glory and victory. She was torn by intestine strife, and was the sport of unprincipled statesmen and generals. The scene presented much food for reflection and moralisation. The history of Thucydides is no heroic epos. Incisive, sedulous, judicial, the genius of Thucydides as a pure historian is undeniable. He makes no parley whatever with seductive legends and traditions irreconcilable with a calmer rationality. He sifted evidence meticulously and indefatigably consulted all available documents relative to his subject. Only in his speeches did he allow himself freedom. These he meant to be true to the spirit and not to the letter. His style, too, is illustrative of his mental character. He builds his sentences on the periodic system, lucid, pregnant, and severe. His idiom is pure and unadulterated Attic. Xenophon (b. c. 429 B.C.) was essentially a man of action. He therefore excels in brilliancy, vividness, and freshness, but both in intellectuality and style he falls far below the level of Thucydides. His finest work is perhaps the *Anabasis*; racy, virile, dramatic, the narrative compels interest, but it is not trustworthy nor convincing. Political economist, historian, philosopher, the range of Xenophon's activities is wide, but he is lacking in intellectual power and thoroughness. Plato is as great a stylist as he is a philosopher, and praise can go no higher. Richness without satiety, grace without elaborateness, and charm without conceit make the dialogues of Plato models of literary excellence for all time.

Though eloquence was appreciated and cultivated in G. as far back as the time of Homer, oratory as a science and art was only first formulated at the time of the Peloponnesian War. The chief reason for the lateness of the development of the rhetorical art is that oratory depends on the study and cultivation of prose composition, and prose composition itself attained literary merit in G. at a much later period than poetry. It was in Sicily that the first treatises on rhetoric were written, the demand for such systems being caused by the need of effective speech in the innumerable law-suits which arose during the redistribution of land on the overthrow of the Syracusan tyranny. Corax and Tisias were the earliest of the Sicilian rhetoricians, but their theories were rudimentary, consisting chiefly in the differentiation of the various parts of

a speech. The argument from probability had a conspicuous place in their evidence. Gorgias of Leontini, sent from his native city in 427 B.C. as an ambassador to Athens, attracted the admiration of the Athenian audiences by the splendour and brilliancy of his oratory, and hence the art was transplanted to Attic soil. The style of Gorgias was distinguished by its floridness and luxuriance. The Alexandrian critics selected ten Attic orators as being of the foremost rank. Each orator exemplified a peculiar excellence in style. The perfect



DEMOSTHENES

harmony and balance of all the excellences of style were attained by Demosthenes, the greatest of the Attic orators, who blends perfectly the virtues of his predecessors and reproduces none of their excesses. But the secret of Demosthenes' enormous power of eloquence was a moral force generated from the soul and quickening to vital potency the technical graces and devices which he commanded. Alexander, after the sack of Thebes, demanded the surrender of the Athenian orators, and Gk. liberty and Gk. oratory perished side by side. Robbed of its political significance, oratory in the Macedonian age degenerated into declamation, and style into ornament. Asiatic affectation conquered Attic purity.

But the victories of Alexander diffused Gk. letters and Gk. culture over half the world. Gk. became the 'common tongue,' and thus the

spread of Christianity was facilitated by the victories of the pagan sword. It was in Egypt that the scattered Hellenic seeds produced the most exuberant growth. Alexandria became the capital of the intellectual world. But the new Gk. literature was vastly different from the autochthonous literature of free G. The spirit of Alexandrianism was cosmopolitan and not patriotic. The promoters of the new literature were courtiers and grammarians, and their work is characterised by learning and artificiality. Genuine inspiration and high seriousness are lacking in the poetry of Apollonius, Rhodius, Aratus, Lycophron, and Callimachus. But the Sicilian Theocritus (*fl.* 270 B.C.), although enticed to the Alexandrian court by the lavish patronage of Ptolemy Philadelphus, never lost the freshness and warmth of sentiment that the rural surroundings of his youth had inspired. His idylls of Sicilian pastoral life are representations of genuine rustic character and incident, and are clothed in the rich sweetness and charming simplicity of the Doric idiom. Moschus (*fl.* c. 150 B.C.) and Bion (*fl.* c. 100 B.C.) continued the pastoral tradition at Alexandria, but though their elegies excel in grace and delicacy, in naïveté and spontaneity, they pale before the Theocritan idyll.

When compared with the noon-day splendour and effulgence of the literature of free G., the afterglow that lingered during the Græco-Rom. period seems pale and crepuscular. But though the Græco-Rom. period produced no literary work of the highest merit, it nevertheless gave proof of a vigorous intellectual activity, which is all the more remarkable in face of the crucial national calamities. The historian Polybius (*b. c.* 204 B.C.), in spite of the immense scope of his work and the wide field of his activities, is a sane and reliable thinker, and the style of his *General History* was much admired, though it exemplified post-classical innovations in vocabulary and phraseology. Plutarch's *Lives* will live on account of its dramatic and atmospheric power. The wit and satire of Lucian are always lively and refreshing. Longinus' work (*On the Sublime*) shows a singular appreciation of beauty and keenness of critical insight.

The Byzantine literature was purely retrospective and produced nothing of permanent value. Among the Byzantine historians are Procopius (*fl.* A.D. 550), Porphyrigenitus (*fl.* A.D. 940), Zonaras (*fl.* A.D. 1120), and Critobulus (*fl.* A.D. 1450). The most famous critics of Byzantium were

Photius (*fl.* A.D. 850), Suidas (*fl.* A.D. 950), and Eustathius (*fl.* A.D. 1170).

Neo-Hellenic poetry is chiefly bucolic. The first poet writing in modern Gk. who attained literary eminence was Theodoros Prodromos (*fl.* A.D. 1200). Drimiticos (*fl.* A.D. 1625) wrote a pastoral entitled *The Fair Shepherdess*, which contains passages of touching beauty. In 1824 Fauriel made his famous collection of modern Gk. ballads. These spirited ballads deal for the most part with the Klephts, who so heroically raised the standard of Gk. independence. In more recent times the patriotic lyrics of Rhigas captivated the ears of Byron. The amorous Anacreontics of Christopoulous have considerable charm and beauty. The brothers Soutsos show considerable lyric power. Rangaris is, perhaps, the greatest of modern Gk. lyricists. The lyrics of Calvos and Salomos are graceful, but slight.

Greek Philosophy originated in the Ionian colonies of the East. The cults of the Gk. mainland were essentially local, so the early colonists left their gods behind them in the motherland and settled in their new home with minds free for speculative inquiry. The Ionian philosophers of the sixth century B.C. were principally physicists and cosmologists. They sought to reduce the universe to a first principle or single element. Thus Thales postulated that the origin of all things was water. Anaximander took for his first principle 'the infinite,' which he conceived as being intermediate between the elements. Anaximenes selected air as the primary substance, from which he held the universe was evolved by the processes of rarefaction and condensation. Heraclitus, the last of the Ionian school, adopted fire as his basic element. He was also the originator of the theory that the universe is in perpetual flux. The philosophical teachings of Pythagoras of Samos were of a psychological and religious character. The theory of numbers played an important part in the Pythagorean doctrines. Harmony was built on numbers and was, according to Pythagoras, the key to the universe. Among the religious tenets of the sect the doctrine of metempsychosis had a foremost place, and inspired the brotherhood to observe a life of religious asceticism. The Pythagorean philosophy was largely influenced by the Orphic mysteries, in which immortality and spiritual purification were the leading ideas. Xenophanes was the founder of the Eleatic school. He was the first Gk. rationalist, boldly attacking the uncompromising anthropo-

morphism of the Gk. Pantheon. His theory of the universe is based on 'the one' as opposed to 'the many,' i.e. on an essential unity as opposed to an essential plurality. Parmenides is the author of the apothegm, 'The "ent" (*ὄν*) is, the "nonent" (*μὴ ὄν*) is not.' He identifies the 'ent' with truth, knowledge, and the 'one.' His disciple Zeno, to disprove 'the many,' invented some famous paradoxical arguments relative to space and time. A reaction followed in favour of 'the many' as opposed to



ZENO

'the one.' Empedocles held that the evolution of the universe was conditioned by the segregation and aggregation of the four elements under the influences of hate and love. Anaxagoras postulated 'atoms' and a 'governing mind.' Democritus and the atomists conceived the universe as generated from atoms falling in space. They postulated the power of deflection in the atom, and hence made aggregation possible.

The sophistry of the humanists was a complete reaction from the natural philosophy of the physicists. In the teachings of the new school the macrocosm was of secondary importance as compared to the microcosm. Though the Gk. sophists had no doctrine in common, they all based their speculations on an initial sciep-

ticism. Their influence was negative rather than positive, and destructive rather than constructive. The famous aphorism of Protagoras is characteristic of the sophists' mode of thought—'Man is the measure of all things, of what is, that it is, and of what is not, that it is not.' The empirics of the sophists did not immediately benefit Gk. thought and morality, but they paved the way for the advent of Socrates.

Though Socrates is justly called the father of critical philosophy, he never committed his doctrines to writing. Our knowledge of his theories and principles is derived from two of his disciples—Xenophon and Plato. Formerly Xenophon was regarded as the more trustworthy authority, but in recent years there is evidence of a reaction in favour of Plato. Socrates followed the sophists in basing his theories on a primary scepticism or agnosticism; he was also at one with the sophists in applying empiricism as a final infallible test to all theories. The dialectical method of philosophical inquiry was the invention of Socrates. He himself assumed ignorance and by deferential interrogation he elicited from some bystander an opinion on the subject he wished to investigate. Starting with this dogmatic assertion of the respondent, he proceeded by a systematic series of questions and answers to lead his victim up to a consequence inconsistent with his primary proposition. This was the so-called *ἄεγχο*, or destructive process; the false opinion has been swept away, and the mind is now unprejudiced for the receipt of a substitute. The new opinion was reached by induction, from the respondent's admissions in a fresh series of interrogations. Most often the object of this philosophical research was a definition, and the mass of definitions attained formed Socrates' ethical system. Virtue, he held, consisted in the knowledge of such definitions and opinions; for right action, he conceived, was the logical consequence of right knowledge. Virtue is knowledge and knowledge is the 'good.' The proof and justification of these Socratic axioms were found in utility.

Until recently the doctrines of Plato were treated as a reaction from, rather than a development of, those of his master, Socrates. Plato was regarded as a pure idealist and Socrates was classified as an uncompromising empiricist. The great point of departure was the Platonic theory of ideas. But critics are veering round. The extremists not only find in the Socratic final definition an adumbration of the Platonic theory

of final ideas, but also credit Socrates with the full-fledged theory. Thus the modern tendency is to emphasise Socrates' indebtedness to the abstractions of the Pythagoreans rather than his indebtedness to the empirics of the sophists. But be that as it may, the ideal theory is chiefly associated with Plato's expositions. The Platonic hypothesis is, briefly, that transcending the plural phenomena, which are mutable, imperfect, temporal, generated, and opined, there are single ideas which are immutable, perfect, eternal, ungenerated, and known. Beyond the ideas is the idea of ideas, the 'supreme good.' The ideal life is the philosophical life of approximation to, and contemplation of, the ideas. The soul is akin to the eternal ideas; the body is related to the ephemeral phenomena.

Aristotle bodily rejects Plato's theory of ideas. His philosophy is inductive. According to Aristotelian conceptions, it is the species which exists and can be known. From the species his metaphysical and transcendental hypotheses are derived. Aristotle's system of ethics is based on empiricism. Man's chief end is the attainment of true happiness, and happiness consists in an energy of the soul, which accords to virtue. Virtue is of two grades, moral and intellectual. Moral virtue is attained when man's rational being correctly governs his appetitive and emotional being. The prime virtues are nine, of which seven are moral and two are intellectual. The moral virtues are courage, temperance, liberality, munificence, magnanimity, self-respect, and gentleness. These virtues are really 'means' between immoral 'extremes,' e.g. courage is a mean between rashness on the one hand and cowardice on the other. Towards the attainment of these virtues a sufficiency of the world's goods contributes. The intellectual virtues are judgment and wisdom. The highest life consists in the exercise of the intellectual virtues, and is the philosophical life of contemplation. The moral life consists in social action, and is inferior only to the contemplative life.

The Academic school founded by Plato and the Peripatetic school founded by Aristotle are the principal philosophical orders of G. The minor schools which arose diverged from the two rival systems and became extravagantly metaphysical or extravagantly material.

Epicurus dismissed the abstractions of the speculative idealist and founded a new philosophy on the sensations of the practical materialist. The senses were regarded as infallible,

and the chief good in life was happiness. But happiness is of two kinds. There is exciting carnal pleasure and there is also tranquil mental pleasure. The latter Epicurus pronounced supreme. In his theory of the universe Epicurus revived the atomism of Democritus. All that is is corporeal and composed of atoms; soul itself is but a harmonious combination of finest atoms.

The Stoic school was founded by Zeno; its doctrines are largely eclectic. Antisthenes, an immediate follower of Socrates, had founded the Cynic school, whose chief aim was an austere asceticism. The Cynics taught that virtue was alone worthy, and happiness was madness. A minimum of the world's goods was essential for the practice of the virtuous life. These tenets Zeno at first embraced, but latterly modified with views borrowed from various antithetical systems. The Stoic doctrines gravitated round two central and corresponding ideas—the unity of the macrocosm, or universe, and the unity of the microcosm, or man. The macrocosm was conceived as a living organism, governed by intelligence, which underwent transformation from, and reabsorption into, its primitive substance or being. The microcosm also is governed by intelligence, survives death, and attains thereby true being. The basis of Stoic ethics is harmony between the microcosm and the macrocosm. Such harmony is attainable by man when he leads a life of moral virtue. There are no gradations between good and evil. The ideal man of the Stoic philosophy is self-sufficient, free, mislead neither by error nor emotion, and in no wise inferior to a god. But while the Stoics emphasised self-sufficiency, they did not neglect the duties of social life. All men, whether Gk. or barbarian, bond or free, were citizens of the world-city of God. The humanity inspired by these doctrines tempered the exclusiveness and rigidity of Gk. patriotism, and brought comfort during the stress of national calamities. Stoicism was in complete harmony with the finer Rom. ideals. Its most beautiful and noble interpretation is the book of *Meditations* by the Rom. emperor, Marcus Aurelius. Throughout the empire's long nights of blackness it was the one spiritual lamp that burned steadily upwards.

Greek Art is conveniently considered under three heads: painting, architecture, and sculpture. The architectural and sculptural remains are considerable and representative, but extant examples of painting are scant, and, for the most part, belong

to the periods of immaturity and decline. Specimens of Gk. vase-painting are, however, plentiful, but they possess the disadvantage of giving us no adequate idea of the development of the use of colours. Excavations in Cnossus and Mycenæ have revealed examples of Gk. vase-painting which belong to the millennium 2000-1000 B.C. The vases are exceedingly beautiful in shape, and the painting is of a very vigorous and free type. There are some examples of geometrical and conventional designs, but the finest specimens exhibit free drawings of plants, animals, and human figures, which can bear comparison with the most beautiful products of the Hellenistic age. The Dorian conquests checked the development of Mycenaean or pre-historic Gk. art, and the art of vase-painting was arrested with the sister arts. The earliest specimens of Attic art are of the geometric type; the figures are rigid and the balance is laboured. Prior to the sixth century B.C. light red clay was used and the figures were painted in rich black glaze. Lines of physiological and ornamental detail were incised on the black with a fine point. Other colours were frequently superimposed after the firing of the black—notably white and purple. But the effect of these black silhouettes on the light background was always grotesque and not seldom ludicrous. In the sixth century B.C. a complete reversal of this arrangement was effected. The figures were left in the light ground-colour, and the background was superimposed in black glaze. Details in the figures were then drawn in fine lines of glaze. The red-figure vases comprise the most beautiful specimens of Attic vase-painting. In the period of the decline white washes were frequent in the red-figure vases and simplicity of design was abandoned for elaborate detail. Our knowledge of Gk. mural and easel painting is mainly derived from critical comments scattered through classical authors. There are, indeed, extant specimens of Gk. pre-historic wall-painting found at Mycenæ and Cnossus, and, like the vase-painting of the same period, they show a remarkable beauty of conception and freedom in execution. Polygnotus was the first great Athenian mural painter. He flourished during the inspiring epochs of the Persian wars. He is especially commended for his treatment of human expression and his skill in representing drapery. At the close of the fifth century, mural painting was succeeded by easel painting. Perspective was studied more carefully by the

younger school, and the effect aimed at was emotional and sentimental. Zeuxis is the representative painter of the period. He was most successful in his delineation of the female figure, especially in the nude. The 'Helen' of Zeuxis in the temple of Hera at Croton was his most perfect achievement. The Attic school was characterised by its free naturalness, and the representative names are Euphranor and Nicias. Apelles, the greatest of all the ancient painters belonged to the Ionic school and flourished about 350 B.C. His works were chiefly portrait painting—a new departure in Gk. art, which flourished under Macedonian court patronage. The ideal element entered into his portraiture, through the addition to his subject of mythological or symbolical motives. Thus he painted equestrian portraits of Alexander the Great in company with the Dioscuri and leading War in chains behind him. His most famous picture was, however, a mythological subject entitled 'Aphrodite Anadyomene.' It represented the goddess in the nude, rising from the sea and wringing the water from her hair. The descriptions of this picture give us some conception of that peculiar 'charm' by which the ancients characterised the works of Apelles. In conception sentimentality and in treatment super-elaboration vitiate the art of the decline; in subject genre paintings predominate.

Prehistoric Gk. architecture, as revealed to us by excavations in Knossos, Mycenæ, Tiryns, and Troy, was of a very massive and substantial type. A characteristic feature was the so-called 'Cyclopean walls' whose giant structure the imagination of the ancients attributed to the Cyclopes. The stone walls of domestic buildings in these sites only reached an elevation of a few feet, the superstructures consisting of wood and cement work. The column had already differentiated itself in Mycenaean architecture.

Mycenaean civilisation disappeared during the general upheaval that followed the Dorian invasion. With these Dorian invaders is connected the differentiation of the Doric order in Gk. architecture, one of the three characteristic architectural orders of G. The column is the distinguishing feature of these orders, and was itself, no doubt, evolved from the tree-trunk props of primitive structures. In G. the column was fluted and tapered slightly upwards, thus producing the combined effect of stability and grace. The Doric column is the boldest, simplest, and most impressive. The fluted shaft rests directly on the foundation step or

floor with no intervening base, and is capped by a simple square abacus. In the noble beauty and perfect proportions of the Parthenon at Athens, the Doric order finds its most sublime expression. The architecture of the Ionic order gains in delicacy, but loses in sublimity. The shaft of the Ionic column is also fluted, but the flutes, being separated by flat fillets, do not intersect, as in the Doric pattern. The shaft rests on a plinth or base, and culminates in the characteristic volute. The finest examples of the Ionic order are the remains of the temple of Nike Apteros and the Erechtheum at Athens, whose chaste beauty and symmetry are incomparable. The Corinthian order is more susceptible to elaboration and embellishment. Tradition ascribes its invention to Callimachus, who drew his inspiration from a votive basket filled with the twining leaves of the Acanthus plant. The Corinthian column follows the Ionic in all detail except the capital, which represents a cluster of Acanthus leaves. The finest specimen of the order is the Olympium at Athens. This order, unlike its sisters, admitted superfluous detail and enrichment, and with variations was almost exclusively adopted by the Romans.

The finest work of the Gk. architects was devoted to the building of the temples. The temples of G., like the temples of the Hebrews and other nations, were, for the most part, built upon hill-tops. The primary function of the Gk. temple was to enshrine the statue of the deity. The statue was placed in the main chamber or *naos*, whose great doors faced E., and which was flanked with colonnades. The *naos* was divided into two chambers. The whole was surrounded by an external ambulatory, termed the Peristyle, which was also flanked with columns. The temple was adorned with magnificent sculpture and mural decoration.

Gk. architecture is characteristic of Gk. genius. At its best it is strong but not stern, simple but not plain, noble but not overwhelming; it is beautiful yet chaste, restrained yet powerful, clearly definite yet infinitely suggestive. Here there is nothing in excess, but the realisation of that mean of means, neither too little nor too much.

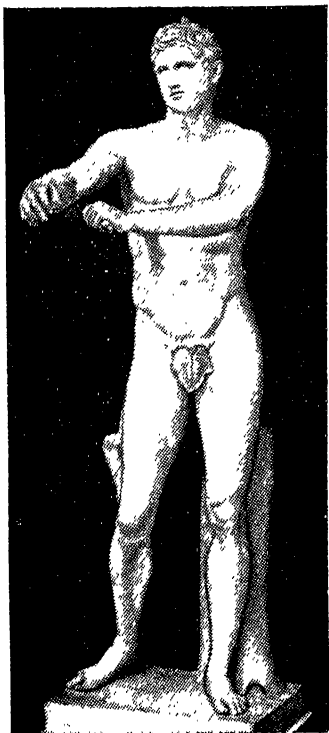
Gk. sculpture was closely associated with temple architecture. The temples enshrined the statues of their respective gods and the metopes were adorned with the choicest achievements of glyptic art. Faithfulness to nature, combined with the worshipful and dedicatory spirit of idealism, are the essential qualities of Gk. statuary.

The ideal and the inspiration came from the gods, whose perfections the Gk. sculptors sought to portray, but the type and model were derived from the palaestra, where Gk. athleticism had moulded the human physique to superb proportions. Thus was the ideal realised and at the same time the real idealised.

Just as the temple column was evolved from the rude tree trunk that propped the primitive dwelling, so the perfect statue was evolved from a rough shapen trunk, which represented some deity. Several examples of this block type of wooden image existed in classical times. A rough wooden block in the Parthenon was revered as being the most ancient statue of the goddess Athena. Herodotus refers to similar representations of the Dioscuri, and the Hermes busts which stood in classical times at the cross-roads mark the transition stage from limbless block to perfect statue. In the early stages of the art the pose is simple and the arrangement of the members is absolutely symmetrical, the legs being stiff and close together, and the arms hanging straight and rigid. The drapery of these early types falls in stiff perpendicular folds, showing no indication of the form beneath. Muscles and other physiological details are but imperfectly rendered. One of the finest productions of this early period is the famous 'Charioteer' from Delphi (c. 480 B.C.). The stiffness of the drapery and the simplicity of the pose are indications of the archaic conventions, but the suggestive poise of the head and the slight backward bend of the body give to the attitude a forcible truth which harbingers greater developments. The works of Pythagoras and Myron bring us to the very threshold of sculptural maturity. These sculptors were most successful in representing athletic types. The celebrated 'Discobolus' of Myron is a most complex pose, but there are indications of archaism in the lack of suppleness and flexibility.

Pheidias, the greatest sculptor of ancient G., was b. about 450 B.C. He thus flourished in the period when G., flushed with her victories against the Persians, realised for the first time her infinite potentialities. It was an age of great inspiration, an age which produced Pericles, Pindar, Aeschylus, Sophocles, Euripides, and a galaxy of lesser stars. The colossal works of Pheidias were the gold and ivory statue of 'Athena Parthenos,' the bronze statue of 'Athena Promachos,' and the gold and ivory statue of Zeus at Olympia. Unfortunately these statues have all

perished. The 'Athena Parthenos' represented the goddess wearing the 'ægis,' and bearing in her right hand a statuette of victory. In the great bronze statue of the Acropolis the goddess was represented in full armour; the figure dominated the city and was a landmark to ships at sea.



APOXYOMENOS

(After Lysippus)

Pheidias drew his inspiration for his colossal Zeus from Homer's description of the thunderer (*Iliad* i. 527). The power of this statue has this ancient tribute, 'Let the man who is sick and weary of soul, who has suffered much sorrow and tribulation, and whose pillow is visited not by kindly sleep, but stand before the image, and he will, I deem, forget all the terrors and troubles of human life.' From the sculptures of the Parthenon we derive our first-hand

knowledge of the works of Pheidias and his school. The eastern and western pediments contained the finest sculptures. The 'Theseus' (of the eastern pediment) is a nude figure in repose, yet the very calmness is suggestive of power and potentiality. The so-called 'Three Fates' (also of the eastern pediment) is a harmoniously balanced group of singular beauty, the draperies fall in soft and clinging folds exquisitely revealing the physiological details of the figures. Pheidias' works thus represent the sublimest achievements of Gk. sculpture. Polycleitus of Argos (c. 452-412 B.C.) as an artist approached most nearly to an equality with Pheidias. The characteristic feature of the works of Pheidias was sublimity; nobility is the distinguishing quality of the works of Polycleitus. The massive and splendid figure of the 'Doryphorus' is characteristic. This statue became known as the 'Canon,' as embodying a perfect representation of the ideal human figure.

Characteristic of the transition period is the 'Eirene with Infant Plutus' of Cephisodotus. The stiff folds of the drapery are archaic survivals, but the sentiment in the poise of the head and expression of the faces are indicative of the coming age of emotion and sentiment.

The representatives of the new school are Scopas, Praxiteles and Lysippus. In this school representations of the human figure and the minor deities predominate. The restraint and repose of the Pheidias school have given place to the emotional, the sentimental, and the sensational. Scopas was particularly successful in representing motion and frenzy. The works of Praxiteles chiefly represented the minor deities, and these in their more sensuous aspects. His 'Cnidian Aphrodite' was a nude figure of the goddess about to enter the bath. The flesh was tinted to a most life-like hue, and the effect of the statues was vividly realistic. His statue of Hermes with the infant Dionysus, though exceedingly beautiful, has indications of that softness and sensuality that ran rampant in the decline. Lysippus is the last representative of the loftier traditions of Gk. sculpture, and he is not guilty of the sentimentality already visible in Praxiteles. His sculpture is rather of the bold virile leonine type, as his 'Apoxyomenos' witnesses.

In the third century B.C. the chief centres of Gk. art were Pergamum and Rhodes. Exaggeration and sensationalism are characteristic of the schools, exaggeration of muscle

and sinews in male figures, and of softness and rondure in female figures; sensationalism in the choice of dramatic and harrowing subjects. Representative of the former school is the figure of the 'Dying Gaul,' representative of the latter school is the 'Laocoön' group. These show great technical power.

In the Græco-Roman period the art of sculpture is mainly imitative and reproductive. The period, however, produced some beautiful works, which a fine eclectic spirit, if not genuine creative genius, inspired. The loveliest of these are the 'Venus of Meos,' the 'Apollo Belvedere,' and the 'Diana of Versailles.'

Greek Archaeology.—The anct. Gks. were not interested in the past, although Thucydides in his *History* added a chapter on archaeology. Pausanias, A.D. 150, wrote the first guide-book, and his references to Gk. sculpture of the Archaic period are important. About this time the Gks. collected anct. works of art, but Art for its own sake was not studied. In the eighteenth century Eng. gentlemen began to travel considerably, and many works of art belonging to Hellenistic Greece were brought back to England. At the close of the eighteenth century The Society of Dilettanti commissioned architects to make drawings and studies of buildings in Athens and Asia Minor. Missions to Greece were also sent by the Fr. Academy. Lord Elgin began in 1801 to collect sculpture from Greece, otherwise Greece had been left comparatively unexcavated. But in 1830 the Gk. authorities began the great undertaking of clearing the Acropolis and other anct. buildings of Turkish accretions. Foreign scholars worked under the patronage of King Otho, and details of these excavations were carefully recorded. George Finlay did much to rouse interest in prehistoric archaeology in Greece. He collected, with the help of Gk. schoolmasters, a vast amount of information. But Heinrich Schlieman, inspired by his study of Homer, was the first to carry out archaeological researches scientifically. He identified the site of Hissarlik as Troy and found the 'Treasure of Priam'; and in 1876 he discovered Shaft Graves in Mycenæ. Sir Arthur Evans later made great archaeological researches at Knossos in Crete. Then followed excavations at Phaestos, Hagia Triadha and on many other Cretan sites. Towards the end of the nineteenth century the museums of Athens were built up and later Schools of Archaeology were founded in Greece. At the present time in Athens there are schools of Archæo-

logy of France, Great Britain, Germany, Austria, Italy and America. It is in Greece that genuine archaeological research was first practised, and the Gks. have been extremely generous to all foreign archaeologists working in their country. The Acropolis as it stands now is a perfect example of scientific clearance.

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Greek Archipelago, a collection of islands in the Aegean Sea, belonging to Greece. There are some 300 of them, and they are divided into the following groups: the Eubœa and the Sporades, covering an area of 2216 sq. m., with a pop. of about 145,000, the chief island being Skyros; and the Cyclades, covering 923 sq. m., with a pop. of 141,197. These latter are of volcanic origin and number some 200, of which the most important are Naxos, Syra, Andros, Milos, and Paros. The islands yield a large output of ores.

Greek Church, more correctly spoken of as 'Eastern Church,' and described officially as 'The Holy Orthodox Catholic Apostolic Eastern Church,' is the historical representative of the churches of the ancient East, and consists of fourteen self-governing churches, all of whom possess the same faith, the same bases of worship, and the same principles of government. These are: (1) the Ecumenical Patriarchate of Constantinople, (2) the Patriarchate of Alexandria, (3) the Patriarchate of Antioch, (4) the Patriarchate of Jerusalem, (5) the Archiepiscopate of Cyprus, (6) the Church of Russia, (7) the Church of Greece, (8) the Metropolis of Carlovics, (9) the Church of Rumania, (10) the Church of Servia, (11) the Archiepiscopate of Montenegro, (12) the Metropolis of Hermannstadt, (13) the Metropolis of Bukovina and Dalmatia, (14) the Holy Monastery of Sinai. All these adopt the doctrinal decisions of the seven ecumenical councils, together with the canons of the Concilium Quinisextum or second Trullan Council (692), and entirely reject the pope's supremacy. They express their faith by the Creeds, except that they object to the 'Filioque' clause, saying that the Holy Ghost proceeds from God the Father alone, and believe that their communion is the only true Church of Christ. Moreover, they differ from the Roman Church in that they deny Purgatory and the doctrine of the Immaculate Conception of the Blessed Virgin.

As regards their rites, they adopt the Julian calendar, beginning their ecclesiastical year on September 1, and have four great fasts, the most strictly kept being Lent, and a number of feasts, which they divide into three classes: great, middle, and lesser days. Easter is 'the feast,' then follow sixteen other great feasts, all of which relate to Our Lord or the Blessed Virgin. The middle feasts are those which relate to certain chief saints and apostles, and all the other days are the lesser feasts. The first Sunday of Lent is the feast of Orthodoxy, which was founded in memory of the restoration of the holy pictures after the second Council of Nicæa; the Sunday after Whit Sunday (our Trinity) is All Saints, and there are two All Saints' days, the Saturdays before Sexagesima and Whit Sunday. The stronghold and centre of the whole worship is the Liturgy, or eucharistic celebration, of which two types are used: that of Basil the Great, recited on fixed days, and that of Chrysostom, which is usual throughout the year. The liturgy of the pre-sanctified or the 'Dia-

logos' is only employed in Lent. Preaching of the divine word, which formed a part of the worship, has now disappeared, and is only to be found in some Russian churches. There are eleven chief service books, but no compendium like the Roman breviary, and the service is conducted in 'Old Greek,' or 'Old Slavonic,' not in an unknown tongue. There is plenty of singing, though no instrumental music, and no images except the crucifix are allowed, only ikons of the saints are found in the churches. The vestments are numerous and correspond with those of the Church of Rome. Other characteristics of the Eastern Church are: they baptize by immersion, rarely hear confessions, give Holy Communion under both kinds, confirm by the priest immediately after baptism, ordain by laying on one hand only, crown the spouses at marriage, and anoint not only the sick but even people in good health.

The principles of church government are supported by the holy canons, by the fathers, and by the administrative laws of the emperors referring to the church and completing the canons. According to their principles the head of the Orthodox Church is Christ, and believers other than bishops are divided into two classes, *clergy* (consisting of arch-priests, priests, and deacons) and *laity*. Monastic life, which is an important feature of the Eastern Church, is a single organism resting upon the monastic arrangements of Basil the Great, reduced to order by means of legal commands of ecclesiastical and political legislation. The monks, except those of the imperial monasteries and those of the 'stanropegia,' are subject to their local bishops. The centre of each church is the bishop, but the basis of administration is the Synodical system, all questions on ecclesiastical subjects and discipline being solved in regular or periodically convoked synods. And not only spiritual questions which affect ecclesiastical life are regulated by church law, but also many relations of social life which are bound up closely with those of the church, such as questions of marriage, divorce, etc. The estrangement between the Eastern and Western Churches was of gradual growth. In the early church there were three great bishops of importance, those of Rome, Alexandria, and Antioch, Rome having some sort of primacy and always vindicating the right of judging appeals against the other patriarchs. The rivalry between the churches seems to have begun when the seat of the empire was transferred from Rome to Constantinople. For this left the Head

of the Church of Rome free from the interference of the court and meddling statesmen, and this, added to the fact that the Eastern patriarchates were engaged in violent disputes, did much to increase his power. But it was not to be expected that the pope's pre-eminence would be acknowledged in the East, and to press it upon the patriarchs in times of irritation resulted in schism. The Eastern theology had its roots in Greek philosophy, while a great deal of Western theology was based on Roman law. This gave rise to misunderstandings, and finally led to two different ways of defining one important doctrine, the procession of the Holy Spirit from the Father and the Son. Political jealousies aggravated the disputes, and at last the final break came in 1054 when Pope Leo IX. excommunicated Cerularius and the whole of the Eastern Church. The separation was now final, and the ostensible cause was the introduction of the word 'Filioque' into the creed, and it is this addition which was and is still the permanent cause of separation.

Greek Fire, a name applied in general to the different kinds of liquid fire employed in the Middle Ages, but specifically used of a preparation of 'wet fire' invented by an architect named Callinicus, who lived in the reign of Constantine Pogonatus (648-685). He is said to have fled from Heliopolis in Syria to Constantinople, and his 'wet fire' was used at Cyzicus to set fire to the Saracen ships. Exactly what the mixture was is unknown, but Lieut.-Col. H. W. L. Hime, after a careful study of all available evidence, decided that it differed from the other preparations of the kind in having quicklime as an ingredient, which, when mixed with sulphur, naphtha, etc., took fire spontaneously when wetted.

Greeley, a city of N. Colorado, U.S.A., and the cap. of Weld co. It is situated on a feeder of the S. Platte river in a fertile valley, and is served by the Denver Pacific Railway. There is a trade in flour, lumber, and sugar. Agriculture and fruit growing are carried on, and there are rich coal mines in the vicinity. Pop. 12,203.

Greeley, Horace (1811-72), an American journalist and politician, b. at Amherst, New Hampshire. His family became very poor, and the boy worked as a day labourer until he was apprenticed in the office of the *Northern Spectator* in Vermont. After many hardships G. found his way to New York. In 1833, with the partnership of a fellow-workman, F. V. Story, he published the first cheap paper in New York, called the *Morn-*

ing Post. This paper failed, and after many adventures among several newspapers, G. established his reputation as an editor of the *Jeffersonian*, the *New Yorker*, and the *Log Cabin*. In 1841 he founded the *Tribune*, a paper which largely influenced public discussions of the time. He was among the first to advocate violently the emancipation of slaves; it is said that later he influenced Lincoln to issue his proclamation of emancipation. In the fateful year before the Civil War broke out, he was one of those who opposed coercing the South to remain in the Union. He favoured their peaceful withdrawal. Later, he changed his mind and held that the Union must be preserved. In the Republican Convention of 1860, he was a stout friend of Lincoln and helped to secure his nomination as President. After the conclusion of peace, when the Civil War was ended, he lost much of his popularity by offering himself as bail for Jefferson Davis. In 1872, he with other great Republican leaders opposed the re-nomination of General Grant for a second term as President. When they saw this was futile, they formed the liberal Republican Party and named G. for the Presidency. The wrecked Democratic Party also named him. G. attacked the corruption in gov. and the continued civic disability of the ex-Confederates. But the Grant Republicans 'waved the bloody shirt,' as it was phrased, meaning they claimed that the Republican party at the cost of the blood of its sons had saved the Union, and G. was overwhelmingly defeated. This, coupled with the death of his wife, unhinged his reason, and he d. shortly after. He was an exceedingly capable and intellectual man; during his life he was a target for his foes and for the ignorant, but after his death he became publicly acknowledged as a leader of public thought and opinion. He published many works, among them *History of the Struggle for Slavery Extension*, 1856; *Hints towards Reforms*, 1850.

Greely, Adolphus Washington, American Arctic explorer, b. March 27, 1844, at Newburyport, Mass.; son of John Balch G. He served in the Union Army during the Civil War, and became attached to the signal service in 1868. In 1881 he was appointed to command the Arctic expedition, with the purpose of establishing a chain of thirteen stations about the N. Pole for scientific and meteorological observations. He sailed from St. John's, Newfoundland, in the *Proteus*, with twenty-four men. A detachment of his expedition under

Brainwood and Lockwood penetrated to a higher latitude than any had attained before. G. and his companions suffered extraordinary hardships. Three separate relief expeditions were sent after him; the third, commanded by W. Scott Schley in 1884, arrived at Cape Sabine and found G. and six of his companions out of the twenty-four on the point of starvation; the rest had perished. His scientific records were saved, and a valuable collection of specimens. Became major-general, 1906. Has been concerned in the laying of telegraph cables, chiefly for military purposes. He installed the first long-distance radio-telegraph: in Alaska, 1900-1. He published *Three Years of Arctic Service*, 1885; *American Explorers*, 1894; and books on various climates.

Green, John Richard (1837-83), an English historian. He was b. at Oxford, and educated at Magdalen College School and at Jesus College, where he won an open scholarship. In 1860 he took holy orders and became a curate in London. In 1866 he was appointed incumbent of St. Philip's, Stepney. He studied history, and at this time wrote frequently for the *Saturday Review*. His health broke down; his views on the teaching of the Church of England changed, and he retired from the church and accepted the post of librarian at Lambeth. He thus devoted himself to history. In 1874 he published his *Short History of the English People*, a brilliant picture of the social and economic evolution of English life, in contrast to the usual political histories. This became exceedingly popular. His style is vivid, interesting, and accurate, and he made the reading of history a pleasure to thousands who had regarded it as tedious and dry before. In 1882 he wrote the *Making of England*, and in 1883 *The Conquest of England*. On his death his wife was left to finish the last book. It has been said that *Robert Elsmere*, by Mrs. Humphry Ward, is partly a portrait of him. Mrs. G. (Alice Stopford) helped considerably in her husband's work and has also written valuable historical works, especially relating to the early history of Ireland.

Green, Thomas Hill (1836-82), an English philosopher, b. at Birkin in Yorkshire, of which his father was rector; educated at Rugby and at Balliol College, Oxford; elected fellow, 1860. He spent his life in teaching, chiefly by lectures on philosophy as fellow and tutor of his college and as Whyte's professor of Moral Philosophy, from 1878 till his death. His influence on the philosophy school at Oxford both during his life and in suc-

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ceeding years has been great and has stamped the final honours examination of Literæ Humaniores with his Hegelian and Kantian idealism. His published works were few; apart from his Introduction to the standard edition of Hume (T. H. Green and T. H. Grove), his philosophy is stated in the *Prolegomena to Ethics*, 1883, edited by H. C. Bradley, and the *Principles of Political Obligation*; his collected works were published and edited, with Memoir, in three volumes, by R. L. Nettleship. *See also* W. H. Fairbrother, *Philosophy of T. H. Green*, 1896; J. H. Muirhead, *The Service of the State, Four Lectures on the Philosophy of T. H. Green*, 1908.

Greenaway, Kate (1846-1901), an English artist and illustrator of books in London. Her father was John G., an engraver and draughtsman. She studied at South Kensington and at the Slade schools. In 1868 she first exhibited water-colour drawings at the Dudley Gallery, London. In 1873 she began to illustrate for *Little Folks*, and commenced her series of Christmas cards for Marcus Ward; they were full of quaint beauty and charm and became extremely popular. In 1877 she began to draw for the *Illustrated London News*. The charming freshness of her illustrations in her books, one of which, *Under the Window*, sold to the extent of 150,000 copies, made her famous. Her drawings of children, dressed in the style of the early nineteenth century, are full of artistic grace and delicate quaintness. Among her best known illustrated books are: *A Birthday Book for Children*, *The Pied Piper of Hamelin*, *Mother Goose*, and *Little Ann*.

Greenback Party, an American political party formed in 1874 which advocated that the circulation of notes by state and national banks should be prohibited, that greenbacks alone should be circulated, and that the whole of the U.S. debt should be paid in greenbacks. It ceased to exist as a party in 1884.

Greenbacks, the popular name of the legal tender circulating notes of the U.S.A., so called because the back is printed in green ink. Treasury notes were first issued of necessity to provide funds for the Civil War in 1862; there were three of these issues, the first in February, the next in July, 1862, and the last in March 1863. The notes soon depreciated in value and fell to 35 cents on the dollar. An Act of March 1878, restoring specie payments, had the effect of fixing the amount then current as the regular circulation, and G. have never fallen below par.

Green Bay: (1) A city of Wisconsin,

U.S.A., and cap. of Brown co., situated at the head of G. B., near the mouth of Fox R. It is 114 m. N. of Milwaukee, and 240 m. N. of Chicago. It is a centre of the lumber trade and has an export trade in shingles, staves, etc. There are iron works, flour-mills, breweries, etc., and the fisheries are important. There are a good harbour and a steamboat service. Pop. 37,415. (2) A large arm of Lake Michigan, upon which the above city stands. It is 100 m. long and from 15 to 35 m. wide.

Greenburgh, a township and vil. of New York, U.S.A., in Westchester co., situated on the Hudson R., $\frac{5}{8}$ m. from Yonkers. Pop. 35,821.

Greenbush, or **East Albany**, a tn. of New York, U.S.A., situated in Rensselaer co., on the Hudson R. It is opposite Albany, with which it is connected by a railway bridge. There are sawmills, a tannery, colour works, and manufs. of tools. Pop. 7311.

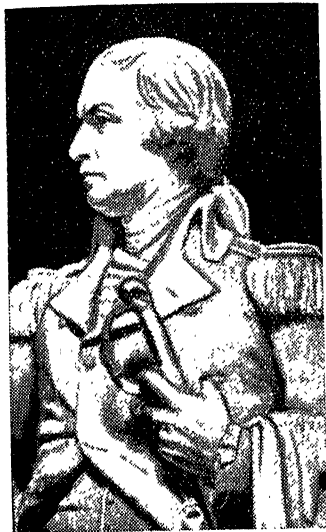
Greenbushes, a post tn. of Western Australia, and also one of the chief tin-bearing districts of W. Australia.

Green Cloth, Board of, a committee of the British royal household taking its name from a green-covered table at which it has long been a custom for the board to sit when transacting business, which is to examine and pass all the household accounts. At one time they also had the power to punish offenders within what was known as the 'verge of jurisdiction,' or the precincts of the palace. The Board is presided over by the Lord Steward, and consists of the leading officials of the household.

Greene, Maurice (1695-1755), an English musical composer, *b.* in London. He began his musical career as a chorister in St. Paul's Cathedral, becoming in 1718 the cathedral organist. Nine years later he was appointed organist at the Chapel Royal, and in 1730 was elected to the chair of music at the University of Cambridge and had the degree of doctor of music conferred on him. He was the composer of a great deal of church music, of which the best known works are *Forty Select Anthems*, and *Catches and Canons for Three or Four Voices*. He also wrote several oratorios, a masque and a pastoral opera. He helped to found the Society of Musicians for the help of poor artists and their families.

Greene, Nathaniel (1742-86), an American general, *b.* at Poto-womut in the township of Warwick, Rhode Island. He came of Quaker stock, and was not originally intended for the army, but in 1775, having been for a year in the militia, he was given the command of the

Rhode Island contingent of troops, and joined the American forces at Cambridge. His able generalship won him Washington's confidence, and his promotion was rapid. He took part in many successful engagements, distinguishing himself especially at Trenton and Princetown. In 1780 he was given the command of the Southern army, which was opposed to a far superior force under Lord Cornwallis. His masterly strategy during the retreat from Catwaba to the Dan was such that it enabled him not only to survive the two defeats of Guilford Court



GENERAL NATHANIEL GREENE

(From the statue in the old Hall of Representatives, the Capitol, Washington)

House (March 1781) and Hobkirk Hill (April 1781), but eventually to win the victory of Eutaw Springs and drive the British out of S. Carolina. At the end of the campaign he was offered the post of Secretary of War, but he refused, and in 1785 he settled on the Georgia estate, Mulberry Grove, where he died the following year. See *Life of Nathaniel Greene*, by his grandson, George W. Greene (3 vols.), 1867-71; and *Biography* (New York), 1893, by Brig.-Gen. F. V. Greene in the Great Commander series.

Greene, Robert (1560-92), an English dramatist and writer, *b.* at Norwich; it is not certain who his father was. In 1575 he went to St. John's College, Cambridge, as a sizar, where he took his B.A., and in 1583 he became an M.A. from Clare Hall. According to his own account, his life at the university was utterly disreputable. In 1585 he married, and deserted his wife after the birth of their child, then he went to London, where he soon became famous as a playwright and writer of love fantasies. Before his death he became sunk in every kind of vice, and quite dependent on the charity of very poor persons. The story of his death was disgusting yet pitiful. One of his pamphlets, entitled *A Groat's-worth of Wit bought with a Million of Repentance*, 1592, appears to hold an attack on Shakespeare, part of the quotation being: 'Is in his own conceit the only Shakescene in a country.' Among his other writings are: *Orlando Furioso*, 1594; *The Honourable History of Friar Bacon and Friar Bungay*, 1594. His *Pandosto, the Triumph of Time*, 1588, formed the foundation for Shakespeare's *Winter's Tale*. In 1599 he produced *Alphonsus, King of Aragon* and *George-a-Greene, the Pinner of Wakefield*. His works are filled with wit and charming romance, and contain much good verse. See Churton Collins, *Plays and Poems*, with introduction (2 vols.), 1905.

Green Earth, a mixture of magnesian, ferrous, and aluminium silicates of uncertain composition found in cavities and veins of basaltic igneous rocks. It is evidently a secondary product resulting from altered pyroxene, amphibole, etc., and may resemble serpentine or chlorite. *Glaucinite* is a form of it met with in some of the sandstone of the Cretaceous system.

Greenfield, a city of Massachusetts, U.S.A., and the cap. of Franklin co. It is situated near the R. Connecticut, 34 m. N. of Springfield. There are manufs. of cutlery, tools, and machinery. Pop. 15,500.

Greenfinch, or Green Linnet (*Ligurius*, or *Chloris*), a common European bird, to be found also in parts of Asia and in New Zealand; it is also an occasional visitor to Palestine. It abounds in the British Isles, having a preference for wooded districts. The cock is one of the brightest coloured of the common British birds, its plumage being of a light yellowish-green, with the breast of yellow.

Greengage, the name given to a certain kind of small round plum, grown especially for dessert. It is less hardy than some kinds, and

requires shelter and a good deal of care in cultivation, which follows the same lines as those of the plum.

Greenheart, or **Bibiru**, the popular name given to the species of *Lauraceæ* technically known as *Nectandra Rodiaei*. It is a native of America, and is a tree which yields a useful timber; the bark is employed for medicinal purposes. The term of *G.* is also applied to *Calyptanthus Chytranculia*, a species of *Myrtaceæ*, and to *Columbrina ferruginea*, a species of *Rhamnaceæ*.

Greenhithe, an ecclesiastical par. and vil. of N.W. Kent, England, situated on the Thames, $2\frac{1}{2}$ m. N.E. of Dartford. It was the starting point of the ill-fated Franklin expedition in 1845. There are chalk quarries, a trade in lime and cement, brick-fields, and market-gardens. Ingress Abbey, which formerly belonged to Dartford Abbey, was occupied by Queen Caroline. Pop. 3361.

Greenhouse, see **HOTHOUSE**.

Greenland, an island continent belonging to Denmark, the larger part of which lies within the Arctic circle. It is bounded on the E. by the N. Atlantic and the Norwegian and G. seas, with the Denmark Strait dividing it from Iceland. On the W., Davis Strait and Baffin Bay separate *G.* from Baffin Land. Cape Farewell is the most southerly point, $59^{\circ} 45' N$. The length of *G.* is about 1650 m., and at the northerly part, where it is widest, the breadth is about 700 m. Its total area is about 830,000 sq. m. of which only about 50,000 are free from ice. The interior is covered with a vast glacier of ice and snow, deep enough to bury the mountains and fill the valleys. This inland stretch of ice rises to 9000 ft. and more, leaving only occasional isolated rocks uncovered. The glacier slopes gradually down to the coast, discharging icebergs, which float down the Atlantic and travel S. of Newfoundland. The Humboldt Glacier on the N.W. coast is the largest in the world, having a breadth, where it reaches the sea, of 60 m. The coast is indented with deep fjords, and numerous small islands lie close to the land. Of these Disco is the largest, having an area of 3005 sq. m.; native iron is found here, also coal of a poor quality. Graphite is also mined. The only other mineral of any economic importance is cryolite, found and worked at Ivigtut in the Arsuk fjord on the S.W. coast. The climate varies a great deal from bright sunshine to dense snow and fog; in the warmest month, July, the heat is about $16^{\circ} F.$, and in the coldest month, January, it may drop to $-36^{\circ} F.$ and below,

while inland it may descend to $-90^{\circ} F.$ The climate on the E. coast is more Arctic than on the W., and the land more deeply covered with snow. The plant life of *G.* is of the Arctic type. There are no forests; the dwarf willow and birch are the chief trees; flowering mosses flourish, and the yellow poppy, certain saxifrages, a heath, a rhododendron, an azalea, harebells, campions and numerous other flowers blossom abundantly in some districts during the two months of summer. Gardening is difficult, but in the S. a few vegetables are grown, chiefly radishes and turnips. The chief wild animals are the white polar wolf, the polar bear, the polar fox, the Arctic hare; and the reindeer, although hunted to extinction in the S., still abounds in the more northerly districts. There are several varieties of birds, among them the eider-duck, guillemot, and the ptarmigan. The fisheries are very important, including cod, caplin, halibut, sea trout, etc. The whaling industry, though not as flourishing as formerly, still continues, and the sealing is very important. Narwhal and walrus are also caught. The population in 1921 was 14,355, and consists mainly of Eskimos, the Europeans numbering 274, chiefly Danes. The trade is only with Denmark, it being a monopoly of the Danish crown since 1774. The principal exports, which in 1927 amounted to 6,910,000 kroner, are seal and whale oil, fox, bear, reindeer, and seal skins, eider-down, feathers, and cryolite. For purposes of government the country is divided into two inspectorates, Godthaab and Godhavn, ruled by two governors responsible to the board at Copenhagen. Each inspectorate is divided into districts. These districts have a chief settlement and various outlying hunting stations, of which there are about sixty. Trading is carried out on a system of the gov. giving low prices for the produce, and selling European necessities at the smallest possible rate. The inspectors are magistrates as well as trade superintendents, but crime is very rare. The Danish inhabitants usually live in houses built of imported wood, covered with pitch, while the Eskimo dwell in huts built of stone and turf, entered by a little tunnel. Godhavn, on Disco Is., about half-way up the W. coast, is the capital, but Sydproven in the far S., with a pop. of 901, is the largest settlement. Other settlements are Upernivik, which, until Knud Rasmussen founded a trading station at Thule, was the most northerly village in the world, Umanak, Jacobshavn and Christians-

haab, all within the Arctic Circle, Sukkertoppen, Godthaab, Frederikshaab, Ivigtut and Julianehaab. There is only one settlement, Angmagssalik, on the bleak eastern shore. The history of G., as we know it, began in 1982, when the Norwegian, Eric the Red, sailed from Iceland to find the country which one Gunnbjorn declared he had seen and stayed at. Eric discovered the country and called it G., hoping by this name to persuade people to colonise there; two colonies were formed, one called Osterbygd, in the district of Julianehaab, and another in the district of Godthaab. Remains of these Northmen have been found and numerous ruins. Christianity was introduced in A.D. 1000 by Leif Ericsson; the colonists built twelve churches and a monastery. For four centuries the Norse colony thrived, but by the beginning of the fifteenth century intercourse with the motherland, owing to increased Arctic ice and to epidemics and civil disturbances in Scandinavia, ceased entirely. The fate of the unfortunate colonists is unknown, but when in 1585 John Davies visited G., he found it to be inhabited only by Eskimos. It was recolonised early in the eighteenth century by Hans Egede. From 1261 to 1814 G. belonged to Norway, after which it became Danish. Several Arctic explorers have visited G. The first person to give a trustworthy report of the coast was the Scottish whaler, Captain William Scoresby, in 1822. After this several other expeditions of exploration were made by Gers., Danes, and Englishmen. Nansen, in 1888, travelled along a part of the coast. In 1905 the Duke of Orleans' expedition discovered that the farthest N.E. point was an island. In 1930-31 two exploration parties, one English under Watkins and a German one under Dr. Wagener, wintered in G. In June 1930 a party of Norwegian sea-captains proclaimed the 'annexation' of part of the N.E. coastal region. See Hans Egede, *Description of Greenland*; H. Rink, *Danish Greenland*, 1877; H. Mohn and F. Nansen, *The First Crossing of Greenland*, 1890; Knud Rasmussen, *Greenland by the Polar Sea*, 1921; J. W. Bilby, *Among Unknown Eskimo*, 1923; M. Vahl, *Greenland*, 1928.

Greenland Sea, that part of the Arctic Ocean lying between Spitzbergen on the N. and Greenland and Jan Mayen on the S. In places it is 1500 fathoms in depth, and its greatest width, between Norway and Greenland, is 700 m. The temperature is variable.

Greenlaw, a small tn. of S. Berwick-

shire, Scotland, on the Blackadder. Antiquarian remains are found, including a camp and several cairns. The chief manufs. are woollens and agricultural implements. Pop. 909.

Greenlet Island, an island of Canada, situated in the Strait of Belle Isle. It was proposed that here should be the landing-place of a Canadian Atlantic cable, extending from Clew Bay in Ireland.

Green Mountains, a range of mountains in Vermont, U.S.A., a part of the Appalachian system. Highest peak Mount Mansfield.

Greenock, a municipal and police burgh and seaport tn. in Renfrewshire, Scotland. It is situated on the S. bank of the Clyde, and is 23 m. by rail W. of Glasgow. The town stretches along the water for nearly 4 m. and the harbour works are extensive, including the Victoria and Albert harbours, the James Watt dock, and the Garvel graving dock. The town possesses some fine public buildings: notably the municipal buildings, after the style of the Italian Renaissance, with a tower 244 ft. high; the county buildings (1867), which also possess a tower, 112 ft. high; the custom house (1818) in classic style, with Doric portico; the Watt Institution, founded in 1837 by James Watt (whose birthplace G. is), containing the public library (1783), the Watt scientific library, presented by the founder, and the statue of James Watt by Sir Francis Chantry. The North Parish church, a Gothic building dating from 1591, contains windows by William Morris, and the churchyard is the resting-place of Burns' 'Highland Mary,' and also of James Galt, the novelist. The chief industries are shipbuilding and sugar refining, also iron foundries, paper mills, and a variety of other industries, and there are large fishing fleets for the home waters and Newfoundland. G. has a town council with provost and bailies, and returns one member to parliament. Pop. 78,900.

Greenore, a watering-place of co. Louth, Ireland, situated on Carlingford Lough. It has a steam-packet service and golf links. G. affords beautiful scenery, and has a raised beach, about 10 ft. above sea-level. Pop. 289.

Greenough, George Bellas (1778-1855), an English geologist. He was one of those who founded the Geological Society of London, of which he was the first president. He published: *A Critical Examination of the First Principles of Geology*, and the famous *Geological Map of England and Wales*, in six sheets, and a geological map of India.

Greenough, Horatio (1805–52), an American sculptor, b. at Boston. He evinced a taste for art while still at Harvard, and designed the Bunker Hill monument. In 1825 he went to Rome and became a pupil of Thorwaldsen. The following year he returned for a time to Boston and did busts of Quincy Adams and other well-known men, after which he went to Florence and was commissioned by Fenimore Cooper to do a group of Chanting Cherubs. The American gov. selected him to execute the colossal statue of Washington in the city of that name, which was unveiled in 1843; and later he also executed a group representing the struggle between the Anglo-Saxon and Indian races, 'The Rescue.' The gallery of the Boston Athenæum contains a bust of Lafayette by him, and the 'Medora' and 'Venus Victrix.' In addition to being a sculptor he was also an author, and wrote both prose and verse. See H. T. Tuckerman, *Memoir of Horatio Greenough* (New York, 1853; and *Letters*, ed. by F. B. Greenough, 1887).

Green Point, a suburb of Cape Town, Cape of Good Hope.

Green River: (1) a river of the U.S.A. It forms one of the two great streams which alternately go to form the Colorado. It rises in the Wind River Mts. in W. Wyoming and joins the R. Grand. It has a total length of about 720 m. and flows through deep cañons, which it cuts out for itself through the rocks of the Uinta Mts. (2) Another American river, which is the largest tributary stream of the Ohio. It rises in Kentucky and joins the Ohio near Evansville, Indiana. Length 300 m.

Greenroom, the waiting room built close to the stage of a theatre for the use of actors and actresses during the intervals of a play. Actors suffer from 'stage-glare' caused by the artificial lighting of a theatre, and the colour green is a good antidote to this affection of the eyes, therefore the waiting-room walls were coloured green, hence the name. See *The Green Room Book* (a directory of prominent people connected with the stage, published annually), also *The Secret History of the Greenrooms . . . in the Three Large Theatres, 1790–3* (vol. i., Drury Lane; vol. ii., Covent Garden; vol. iii., The Haymarket).

Greensand, so named from the colour of some of its beds due to the presence of glauconite, consists largely of the internal casts of the chambers of Foraminifera. It was divided by Webster (1824) into Upper Greensand and Lower Greensand; the former in the Upper Cretaceous system (*q.v.*), and the latter in the Lower, being

separated from one another by the Gault. The terms are unsatisfactory, and the name *Vechian* is now frequently applied to the Lower, which is more often yellow or brown than green, while the Upper with Gault forms the *Selbornian*. The Lower Greensand can be traced in England at intervals from the Isle of Wight, through Dorset and Oxfordshire, to Lincolnshire, but it largely centres on the Weald. The Upper Greensand in England is deposited on a V-shaped area from Kent and Sussex to Dorset, back to Norfolk, with a continuation in Lincolnshire and Yorkshire. Many local names exist for G. In Surrey the deposit is known as 'firestone' and 'hearthstone,' in Hampshire as 'malmstone.' The scythe stones and whetstones known as 'Devonshire bats' come from the Upper Greensand, while the concretions of carbonate of lime from the Lower are used in the manufacture of cement. Other products are glass sands and Fuller's earth. In the Weald important correlations exist between these deposits and local scenery, village sites, and industries.

Greensboro, an American city of N. Carolina, U.S.A., situated in Guilford co., of which it is the capital. There are three colleges here, viz. Greensboro Female College (1846), Bennett College, and the State Agricultural College. The surrounding country produces tobacco and fruit, and the town is famous for its cotton mills and blast furnaces. There are also lumber mills, creameries, terra-cotta works and manufactures of machinery, furniture, fertilizer, drugs and canned goods. Iron and copper are mined in the neighbourhood. Pop. 53,569.

Greensburg: (1) A city in the co. of Westmoreland, Pennsylvania, U.S.A., situated in the centre of a coal-mining district, and is slightly less than 30 m. E.S.E. of Pittsburgh. It manufactures glass, iron, and steel. Pop. 15,503. (2) An American city in Decatur co., Indiana, U.S.A., 47 m. S.E. of Indianapolis. Its chief industries are flour milling, quarrying, and lumber. It is a farming and stock district. Pop. 5702.

Greenshank (*Totanus canescens*), a bird of greenish colour, which belongs to the sandpiper class. It is migratory, leaving Great Britain at the end of July and reappearing at the end of April. It is found principally in the N. and W. of Scotland.

Greenstone, a name formerly used quite generally for weathered igneous rocks, *e.g.* basalt, gabbro, diabase, etc., in which a development of chlorite or serpentine had caused

them to become dark green. The term has now been replaced by more definite names dependent on actual analyses. See GREEN EARTH.

Greenville : (1) A city and co. seat of Washington co., Mississippi, U.S.A. on the Mississippi R., 78 m. from Vicksburg. It is in the centre of a large cotton-producing region, and its industries are largely connected with that staple, in which it has an extensive trade. Pop. 14,807. (2) A city and co. seat of Darke co., Ohio, U.S.A., on Greenville Creek, 35 m. N.W. of Dayton. It has a foundry, lumber mills, and machine shops, and is the trade centre for a large and fertile agricultural district, producing cereals and tobacco. Here General Wayne concluded the Treaty of Greenville with the Indians, 1795. Pop. 7036. (3) A parl. bor. in Mercer co., Pennsylvania, U.S.A., about 52 m. S.E. of Erie. The trade of the town is considerable, as it is the commercial centre of a large section of Mercer county and places near in Ohio. The coal, oil fields, and stone quarries in the vicinity add to its industries, which are chiefly the manufacture of flour, woollen goods, machinery, and carriages and wagons. There are also foundries, saw and planing mills, and railway works. Pop. 8628. (4) A city and co. seat of Greenville co., South Carolina, U.S.A., 100 miles N.W. of Columbia. It is in the centre of an extensive cotton-growing and cotton-manufacturing district, and its chief industry is therefore connected with that staple, but it has also carriage and wagon works, iron works, and flour mills. The city is the seat of Furman University, Chicora College for girls, and Greenville Female College. Pop. 29,154. (5) A city and co. seat of Hunt co., Texas, U.S.A., about 50 m. N.E. of Dallas. It is a trade centre for a rich agricultural district, and is also an important cotton market, having cotton compresses and a large cotton-seed oil refinery. There are also flour mills, machine shops, stock yards, and brickyards. It is the seat of Burleso College and Wesley College. Pop. 12,407.

Greenwell, Dora (1821-82), an English writer. She became known as an essayist and a writer of religious poetry. She was compared, because of her religious feeling and expression, with Thomas à Kempis and Fénelon. In 1869 she published *Carmine Crucis*, and in 1871 *Colloquia Crucis*. She published her essays, 1866, and a *Life of Lucordaire*, 1867.

Greenwich : (1) A parl. bor. in the co. of London; situated on the Thames some 4 m. S.E. of the city of London. It is situated on the S. side

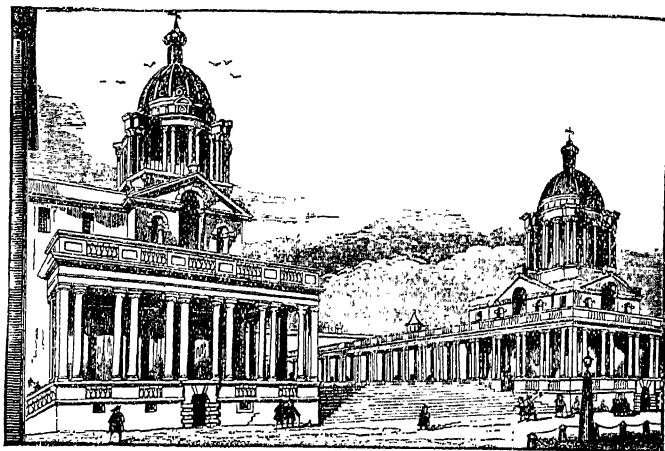
of the river, and there are two tunnels under the river which connect it with the N. side. One is for foot passengers, and the other, called the Black-wall Tunnel, is used by vehicular traffic passing to the India Docks. The town is celebrated for its observatory and hospital. The observatory is built on the point through which passes the first meridian. G. time, which is telegraphed each day to all parts of Great Britain, is the standard time. The observatory stands in lat. 51° 21' 38" N. The borough returns one member to parliament. Pop. 100,493. (2) An American tn., Fairfield co., Connecticut, U.S.A., situated on Long Island Sound, about 30 m. N.E. of New York. It was settled in 1610, is a well-known health resort and contains the villas of many wealthy New York business men. Putnam Cottage, the headquarters of General Putnam in 1778-9, is situated here. There are paper mills, foundries, machine shops and factories for knitted goods, shirts and twine. Pop. 5981.

Greenwich Hospital, as it is still called, though since 1873 a Royal Naval College, occupies the site of an ancient royal palace called Greenwich House, which was a favourite royal residence as early as 1300. It was, however, granted by Henry V. to Thomas Beaufort, Duke of Exeter, and in time passed to Humphrey, Duke of Gloucester, who gave it the name of 'Placentia.' It reverted to the crown in 1447 at his death, and was enlarged by Edward IV.; by Henry VIII., who made it one of his principal residences; by James I.; and by Charles I., who built the 'Queen's House' for Henrietta Maria. It was occupied by the Protector at the Revolution, and after the Restoration by Charles II., who had it pulled down. He, however, started to erect another building, which was granted, in the reign of William III., as an asylum for disabled seamen of the navy. The most notable rooms of the hospital are a chapel with rich marble carved work, and a painting by West of the shipwreck of St. Paul; and a spacious hall, 106 ft. long and 56 ft. broad, which is decorated with representations of sea-fights, statues, portraits, and relics of naval heroes. Formerly 2700 retired seamen were boarded in the hospital, but now the building is utilised for the Royal Naval College, the greater number of the seamen residing with their friends and receiving pensions for personal use. The management of the revenue is vested in commissioners under the Admiralty.

Greenwich Royal Naval College, a

naval school established by the Admiralty for the purpose of giving special technical training to intending officers of the British marine services. It occupies the greater part of the Royal Hospital at Greenwich. The college is open to students for the navy. The Royal Marines, the Indian Marines, the merchant service, and all sides of naval education are cultivated. A course of naval construction is taken; the subalterns of the Royal Marines take this course here as part of their qualifying training.

Britain bought the Khedive's shares in the Suez Canal (1875). In 1880 when the *Pall Mall* changed into the hands of a Liberal proprietor, G. resigned and accepted the editorship of a new paper, the *St. James's Gazette*, over which he ruled for eight years. In 1891 he launched the *Anti-Jacobin*, which, however, was unsuccessful. He continued to exercise his influence in the political sphere by contributing to such papers as the *Westminster Gazette*, *Cornhill*, *Blackwood*, *Pall Mall*, etc. His chief



GREENWICH HOSPITAL

(From an old engraving)

Greenwood : (1) A co. tn. of the co. of the same name in S. Carolina, U.S.A. Its chief manufs. are cotton and cotton-seed oil. There is a military institute and a women's college. Pop. 11,020. (2) The cap. of Leflore co., Mississippi, U.S.A., about 90 m. N.E. of Vicksburg. It manufs. cotton, drugs, furniture, and has saw-mills, canneries and wood-working plants. Pop. 11,123.

Greenwood, Frederick (1830-1909), an English journalist. He began life in a printing-house, but his contributions to various periodicals gained him a reputation, and in 1862 he became, with G. H. Lewes, joint editor of the *Cornhill*, and sole editor in 1864. In this paper he published his novel *Margaret Denzil's History*. In 1865 he became first editor of the *Pall Mall Gazette*, which soon acquired a powerful influence upon Conservative politics. It was due to G. that Great

publications are *The Lover's Lexicon*, 1893, and *Imagination in Dreams*, 1894.

Greet, Sir Ben, an English actor-manager. He revived the practice of giving Shakespeare's plays outdoors, and had several companies of 'Woodland Players.' He co-operated with Mr. W. Poel, the founder of the Elizabethan Stage Society, and together they produced the old morality play *Everyman*.

Greetland, a tn. and par. of West Riding of Yorkshire, England, situated some 2 m. S.W. of Halifax. Pop. 4356.

Grégoire, Henri (1750-1831), a Fr. statesman and ecclesiastic, b. near Lunéville, and educated for the church. He was by nature a democrat and quickly identified himself with the Tiers Etat, taking a prominent part in the chief movements of the Revolution. He be-

came the constitutional bishop of Loir-et-Cher. As such he aspired to remain true to Christianity and the church until the Concordat with Rome was made. This event unseated him and from this time until his death he remained outside the church. He published *L'Eglise Gallicane*, and early in his career, *Essai sur la Régénération de l'Eglise*. See his *Mémoires* (Life by Carnot, 1831), and *Studies* by Krüger, 1838.

Gregorian Calendar, see CALENDAR.

Gregorian Chant, see PLAIN-SONG.

Gregorio, Rosario (1753-1809), an archaeologist, b. at Palermo. He was educated for the Church, took holy orders, and became professor of theology at Palermo. He also devoted himself to the study of archaeology, and was commissioned by the king to superintend the opening of the tombs in his native city. He afterwards studied Arabic, and published in this tongue a history dealing with the subject of Sicily under the Arabs (this work was also issued in Latin). In 1789 he was made professor of public rights in Palermo University. His greatest work is *Considerazioni sulla storia della Sicilia dai tempi dei Normanni sino al presente*, but he also published many old chronicles.

Gregorovius, Ferdinand (1821-91), a Ger. historian, b. at Neidenburg and educated at Königsberg. After spending some time as a teacher he finally took up his residence in Italy where he soon made the history of that country his special study. The result of his long-continued residence in Rome was the publication of his great work, *Geschichte der Stadt Rom im Mittelalter*. This work, which has been translated both into English and Italian, deals with the history of Rome from about the year 400 to the death of Pope Clement VII. in 1534. It is written in marvellous detail and traces the history of the empire and the papacy during that time, showing that the connection between the two was greater than was usually imagined. He published numerous other works, amongst which may be mentioned, *Geschichte der Kaisers Hadrian und seiner Zeit*; *Lucrezia Borgia*; *Die Grabdenkmäler der Papste*; *Geschichte der Stadt Athen im Mittelalter*.

Gregory, the name of sixteen popes:

Gregory I. (c. 590-604), surnamed the Great, was b. in Rome about A.D. 540. He entered a monastery (c. 575), and became one of the seven Regional Deacons of Rome. Pelagius II. appointed him 'Apocrisarius' at Constantinople (c. 579-c. 586), and on his return to Rome, abbot of St. Andrew's Monastery. On the death of Pelagius, he was unanimously

elected pope, and consecrated Sept. 3, 590. He showed remarkable ability and wisdom in his administration of the Church. He sent Augustine to Christianise Britain, reconciled Spain to the faith, and abolished simony among the clergy of Gaul. He regulated the services and ritual, and wrote many of the old chants of the Rom. Catholic Church. His works, comprising many homilies and letters, are important sources for Church and profane history of the time, and are printed in Migne's *Patrologia Latina* (vols. lxxv-lxxix.) and in folio (4 vols. 1705); they include *Moralia*, *Regule pastoralis liber* and *Dialogorum liber*. Consult studies by Barmby, 1892; F. H. Dudden, 1905; Kellet, 1889, and Gasquet, 1904.

Gregory II. (715-31) was b. about 669. He sent Boniface as a missionary to Germany and did all in his power to promote Christianity among the heathen. By his conflict with Emperor Leo the Isaurian, concerning sacred images, as well as on the question of heavy taxation, he greatly increased the political power of the popes.

Gregory III. (731-41) was b. in Syria. He excommunicated the Iconoclasts; he was unsuccessful in his attempt to obtain the help of Charles Martel against the Lombards.

Gregory IV. (827-44) recognised the supremacy of the Frankish emperor, and sided with Lothair in his quarrel with Louis the Pious. He instituted, it is said, the feast of All Saints.

Gregory V. (996-99). During his pontificate John XVI. was set up as an anti-pope (996-7).

Gregory VI. (1045-6) bought the pontificate from his godson, Benedict IX., and was deposed on a charge of simony in the following year. Hildebrand (afterwards Gregory VII.) accompanied him to Germany, where he died in 1047.

Gregory VII. (1073-85), Hildebrand, was b. at Soana, in Tuscany, about 1020, and was educated in the monastery of St. Maria, on the Aventine, and afterwards at Cluny. He accompanied Leo IX. to Rome (1049), and entered holy orders. He succeeded Alexander II. as pope, and laboured to remedy the evils that existed within the church. He aroused the imperial displeasure for prohibiting the abuse of investiture, and was formally deposed by Henry IV. in 1076, whereupon Gregory inflicted a sentence of excommunication and ultimately made him submit to a humiliating penance at Canossa in 1077. In 1080 Henry again deposed Gregory, proclaimed

in his place the anti-pope Clement III. and laid siege to Rome (1081-84). Gregory was relieved by Robert Guiscard, and withdrew to Salerno, where he died. Consult studies by Bowden, 1846; Stephens, 1886; Villemain (Eng. trans. 1873); Vincent, 1896; and Mathew, 1910.

Gregory VIII. (Oct. 21 to Dec. 17, 1187) was *b.* in Benevento. He made peace with Henry VI. and reconciled the Pisans and the Genoese. He died at Pisa while inaugurating a new crusade to recover Jerusalem.

Gregory IX. (1227-41) was *b.* of noble family at Anagni, and studied at Paris and Bologna. He excommunicated Frederick II. for refusing to take part in the crusades, who was absolved in 1230, but was again excommunicated in 1239. The emperor marched on Rome (1241), but Gregory died before the siege began. He made rules against the heretics and systematised the Inquisition. Consult his 'Letters' in *Monumenta Germaniae historica*, 1883, and a *Life* in Italian by Balan, 1872-73.

Gregory X. (1271-76) was *b.* at Piacenza in 1208. During his pontificate a temporary union was brought about between the Gk. and Roman Churches, and the constitution of the conclave was determined upon (1274).

Gregory XI. (1370-78) was *b.* at Limousin in 1330. He reformed the monastic orders, tried to make peace between England and France, and at the earnest entreaty of St. Catherine of Siena transferred the papal see from Avignon back to Italy (1377).

Gregory XII. (1406-15) was *b.* of noble family at Venice about 1326. He opened negotiations with the anti-pope, Benedict XIII. (1408), but on his creation of new cardinals, his former cardinals left him, and both popes were deposed (1409) in favour of Alexander V. Gregory retaliated by banning Benedict and Alexander as schismatical, but was banished from Naples in 1411 and sent in his resignation to the Council of Constance (1415). He became cardinal-bishop of Porto, and died at Recanati in 1417.

Gregory XIII. (1572-85) was *b.* at Bologna in 1502. He took part in the Council of Trent (1562-63). He denounced heresy, helped the Irish against Elizabeth, subsidised Philip II. in his wars against the Netherlands, and supported the Catholic League in France. He promoted the work of the Jesuits, and established the Collegium Germanicum in Rome. On Feb. 24, 1582, he brought about the reform of the calendar.

Gregory XIV. (1590-91) was *b.*

at Cremona in 1535. He was under the influence of Philip II., and excommunicated Henry of Navarre.

Gregory XV. (1621-23) was *b.* at Bologna in 1554. He founded the Congregation of the Propaganda, and helped Ferdinand II. in the Thirty Years' War.

Gregory XVI. (1831-46) was *b.* at Belluno in 1765. He entered the order of the Camaldoli, and later was sent to Rome and created Cardinal. He was a great patron of learning and spent money lavishly on architecture. He wrote *Il Trionfo della Santa Bede*, 1799. Consult *Life* by Sylvain, 1889; Wiseman's *Recollections of the Last Four Popes*, 1858; and Nielsen, *History of the Papacy in the Nineteenth Century*, 1906; also see H. K. Mann's *Lives of the Popes*; L. Pastor's *History of the Popes* (Eng. trans. 1899); M. Creighton's *History of the Papacy*, 1899, and Ranke's *History of the Popes*.

Gregory, the name of a Scottish family, distinguished in mathematics and medicine:

James Gregory (1638-75), a native of Aberdeen, and educated at the Grammar School and Marischal College of that city. He invented the Gregorian reflecting telescope, described in his *Optica Promota*, 1663. While studying at Padua University he published *Vera circuli et hyperbolae quadratura*, 1667; *Geometriae Pars Universalis*, 1668; and *Exercitationis Geometricae*, 1668. He was elected F.R.S. and professor of mathematics at St. Andrews (1669) and Edinburgh (1674).

David Gregory (1661-1708), the nephew of above, *b.* in Aberdeen. He was appointed professor of mathematics at Edinburgh (1683-91), and Savilian professor of astronomy at Oxford (1691-1708). He was a friend and admirer of Newton. Chief publications: *Exercitatio Geometrica de Dimensione Figurarum*, 1684; *Astronomica Physica et Geometrica Elementa*, 1702, and an edition of Euclid, 1703.

John Gregory (1724-73), the grandson of James G., *b.* at Aberdeen. He studied medicine at Edinburgh and Leyden, becoming professor of medicine at Aberdeen (1755), and at Edinburgh (1766-73). His works include: *A Comparative View of the State and Faculties of Man*, 1765; and *Elements of the Practice of Physic*, 1772; his collected *Works* were edited by Tytler (1788).

James Gregory (1753-1821), son of John G., and a native of Aberdeen. After studying at Edinburgh, Oxford and abroad, he became professor of medicine at Edinburgh (1776). He wrote *Conspectus medicinae theo-*

retica, 1788; and *Literary and Philosophical Essays* (2 vols.), 1792.

William Gregory (1803–58), son of the preceding. He became professor of chemistry at Glasgow (1837), Aberdeen (1839), and Edinburgh (1844). He was among the first to advocate Liebig's theories in Great Britain, and translated Liebig's *Principles of Agricultural Chemistry*, 1855. He also wrote *Outlines of Chemistry*, 1845, and *Elementary Treatise on Chemistry*, 1853. Consult A. G. Stewart, *The Academic Gregories* (Famous Scots series, 1896).

Gregory, Isabella Augusta, Lady, Irish playwright and theatrical patentee; b. March 5, 1852; youngest daughter of Dudley Perse, of Roxborough, co. Galway. Married, 1880 (second wife), Sir William Henry Gregory, a former M.P. for Dublin City and Co. Galway. In the last years of the nineteenth century she was foremost in founding a national drama in Ireland, and in 1904 she obtained a patent for the Abbey Theatre—the present home of that drama. Has written twenty-four plays (from *Spreading the News to Dave*) and made adaptations from Molière.

Gregory, St., called 'The Illuminator' (*A.* third and fourth centuries), was of the royal race of the Arsacidæ. His father, Anak, murdered the king of Armenia, for which crime the whole family was destroyed, except G., who was rescued at the age of two years by his nurse. She brought him up as a Christian at Cæsarea in Cappadocia. About 286, while doing mission work in Armenia, he was thrown into a pit where he was kept for fourteen years, but on healing King Terdat of an affliction, he was released and became head of the Armenian Church, which flourished under his care. He *d.* in a cave about 340. See Malan's translation of Vertabed Matthew's *Life*, 1868.

Gregory Nazianzen, St. (329–89), a Doctor of the Eastern Church, *b.* at Arianzus, near Nazianzus, in Cappadocia. A contemporary of Emperor Julian the Apostate at Athens. Appointed by St. Basil Bishop of Sasima, as a protest against the encroachment of the Emperor Valens in Church matters. G. did not reside in his See long, but took up in 379 the task of reconciling to the Nicene faith the city of Constantinople, then Arian. His opponents succeeded at the Council of Constantinople in driving him from the See of that place, because he belonged to another diocese. His work had been accomplished, and he retired to Nazianzus, where he died. He left many poems, orations, and epistles. His works have been pub-

lished by Hervagius (1550), and by the Benedictines (1778–1840). See monographs, Ullmann (Eng. trans. 1857), and Bénéoit (1877).

Gregory of Nyssa, St. (c. 331–c. 396), a younger brother of Basil, bishop of Cæsarea. He was a speculative theologian and wrote *Twelve Books against Eunomius*, *Ten Syllogisms*, *Hexaëmeron*, etc. See complete editions of his works in Migne's *Patrologia* (new edition, 1855–61). See also studies by Rupp (1834), Heyns (1835), and Stigler (1857).

Gregory of Tours, St. (538–94), a Frankish historian, *b.* at Avernî (now Clermont) in Auvergne. He is chiefly remembered as the author of *Historie sive Annalium Francorum libri*, which covers a period from the creation of the world to the end of the sixth century, and is of great value to the student of early European history. Consult the edition by Arndt and Krusch (1885). His complete works may be found in Migne's *Patrologia Latina*, lxxi. See Kurth, *Grégoire de Tours*, 1878, and Mark Pattison's *Essays*, i., 1889.

Gregory Thaumaturgus, St. (c. 210–70 A.D.), an apostle of Christianity in Pontus, *b.* at Neocæsarea, in Pontus, where he became a disciple of Origen. He was consecrated bishop of his native town in 240. His treatises, including a *Confession of Faith*, and a *Panegyric* on Origen, may be found in Galland's *Bibliotheca Patrum*, iii., and in an edition by Bengel (1722). Consult Ryssel, *Gregorius Thaumaturgus* (Leipzig), 1880.

Gregory, Lake, a large salt lake in Southern Australia, E. of Lake Eyre.

Greif, Martin (1839–1911), the pseudonym of Friedrich Hermann Frey, a Ger. dramatist. He was *b.* at Speier, and educated at Munich. His lyrics, which are beautiful and full of noble sentiment, are collected in *Gedichte*, 1868, and *Neue Lieder und Märchen*, 1902. His dramatic pieces include *Nero*, 1877; *Marino Falieri*, 1879; *Konradin*, 1888; *Agnes Bernauer*, 1894; *General York*, 1899, and *Schiller's Demetrius*, 1901. *Hans Sachs*, 1866 (recast 1894), appeared under his own name.

Greifenberg, a Prussian tn. in prov. of Pomerania, situated just over 40 m. N.E. of Stettin; manufs. bricks, machines and stoves. Pop. about 8000.

Greifenhagen, a Prussian tn. in prov. of Pomerania, situated 12 m. S.S.W. of Stettin; great centre of the cattle trade. Pop. 8200.

Greifswald, a tn. in the prov. of Pomerania, Prussia, about 3 m. from the Baltic, and 70 m. N.W. of Stettin. It is situated on the r. b.

of the navigable Ryck, 2½ m. above its mouth. It was founded by some Swedish traders about 1241. There is a fine old church and some late Gothic gabled houses. The university was founded in 1436 and owns some famous tapestry. It has 1100 students. There are iron foundries, and railway carriages are made here. During the greater part of its history it has been a Swedish town, and only became Ger. in 1815. Pop. 38,300.

Greisen, a substance resembling pale granite, from which it differs by the absence of felspar and biotite. It consists essentially of quartz and muscovite; the latter, which has a pearly lustre, giving it a silvery appearance. Accessory minerals are topaz, fluorspar, apatite, etc. Containing small amounts of tin oxide, it is worked as a source of this metal in Cornwall, Saxony, and Tasmania.

Greiz, a tn. in the republic of Thuringia, situated about 50 m. from Leipzig, and is in the middle of the White Elster valley. It manufs. cashmeres, merinos, and other fabrics. There are large dye-works here. Pop. 34,120.

Grenada, an island of the W. Indies which belongs to Great Britain, situated amongst the Caribbees at the southernmost point. It is 21 m. in length, and about 12 m. in breadth. The island is volcanic, having many craters, the highest of which is St. Catherine, which is about 2750 ft. The Grand Etang (alt. 1740 ft.), one of the features of the island, is in reality an extinct crater which has become filled with water and has a circumference of about 2 m. The rainfall is usually excessive, being often more than 200 in. per annum. The capital of the island is St. George, a coaling station for the British fleet, situated on a very fine harbour. The history of the island is extremely interesting. It was discovered in 1498 by Columbus, who named it Conception. In 1756 it was a Fr. possession, but was captured in 1762 by the British. Again it fell into the hands of the Fr., but by the Treaty of Versailles (1763) it was ceded to Britain. In 1795 a rebellion broke out and the Lieutenant-Governor and 48 British subjects were massacred by the rebels. The rising was suppressed in 1796, and since then the history of the island has been uneventful. It is the headquarters of the Gov. of the Windward Islands of which G. is one. They are grouped under one Governor for administrative purposes. During the absence of the Governor the island is presided over by a resident Administrator. The chief crop is cocoa; sugar and rum were formerly the chief industries,

but now not enough sugar even for local needs is produced, though it is on the increase of late years. Other crops are spices, cotton, coffee and limes. There are elementary and secondary schools and the telephone and wireless have been installed. Pop. 78,214.

Grenade, a ball of iron which is made hollow and filled with explosive material. By means of a lighted fuse the ball is exploded. Hand Gs. were at one time carried by soldiers and thrown amongst the enemy, hence the term grenadiers. Gs. played an important part in the Japanese attacks on the trenches at Fort Arthur in 1904. Both Germany and Great Britain had adopted grenades just before the outbreak of the Great War; the former had a rifle G. and the latter a 'stick' grenade, both exploding on impact. Germany, however, was well supplied, whereas Great Britain, in common with her Allies, was forced to improvise grenades from condensed milk tins and similar receptacles. Many varieties were invented during the War, the most famous on the Allies' side being the Mills (*see also* BOMB.) This was fitted with a time-fuse connected with a lever held in position by the hand and made to operate only when the G. had been thrown. This pattern was modified for use as a rifle grenade. Nearly every pattern had a cast-iron segmented body which split up when the grenade exploded.

Grenadier, originally a soldier trained to throw hand-grenades, who had to be distinguished by his height and strength. Subsequently the word was applied to a member of the first company of a battalion. It is now used only of the G. Guards, formerly the first regiment of foot guards.

Grenadier Guards. Ranks as the first regiment in the British Army, though of later date than the Coldstream Guards (*q.v.*). The G. G. date from 1685, in which year a royal regiment of guards, raised by Colonel Russell at the Restoration as a body-guard for Charles II., were combined with Lord Wentworth's regiment formed in 1656, the combined unit being styled the First or Grenadier Regiment of Foot Guards. The G. G. fought at Nanur in 1695; at the siege of Gibraltar, 1704-5; in all Marlborough's great battles; at Dettingen, Egmont-op-Zee; with Moore at Corunna and with Wellington in the Peninsula and at Waterloo. In the Crimean War, they were at Alma, Inkerman and Sevastopol; in Egypt, at Tel-el-Kebir and Suakin and at Khartum; and in the South African War, with Methuen at Modder River. On the outbreak of the Great War

the 2nd Battalion of the G. G. joined General Sir John French's 'Contemptible Little Army,' and took part in the famous retreat from Mons and the Battles of the Aisne and the Marne. At the end of Oct. 1914 it defeated the renowned Prussian Guard in their many efforts to break the British line and reach the Channel Ports. The 1st Battalion landed at Zeebrugge on Oct. 7, 1914, and took up a position in the Ypres sector. In March 1915 it distinguished itself at the Battle of Neuve Chapelle. The 3rd Battalion went overseas in August 1915, and a 4th Battalion joined it later in the year. In the summer of 1915 the battalions of Foot Guards at the front were formed into a Guards Division under the command of Lord Cavan. In the 1916 Battle of the Somme the 1st Battalion made a great name for itself by its gallant conduct at the action at Les Boeufs. The principal operation in which the G. G. took part in 1917 was the breaking up of the Ger. offensives in July and Aug. on the Yser Canal. The successes gained here drew a message of admiration and praise from the King. In Nov. they moved further S. and took part in the attack against Cambrai (q.v.) in which the 4th Battalion earned the special thanks of the G.O.C. 40th Division for advancing to his support at Bourlon Wood (q.v.) across the open, which was under heavy shell fire. From Jan. to March 1918 the G. G. were in the Arras sector (see ARRAS, BATTLE OF), and felt the full force of the great Ger. break-through. By the time the Allies' counter-offensive was launched in Aug. all battalions had been re-organised and re-equipped. In this offensive the 1st Battalion gained further laurels by the capture of St. Leger and at the crossing of the Canal du Nord. In the latter operation Viscount Gort was twice wounded, his gallant conduct winning for him the V.C. After the Armistice the Guards Division formed part of the Army of Occupation in Germany.

Grenadines, a chain of small islands belonging to the W. Indies, in the Windward group. They extend between St. Vincent and Grenada for 60 m., and are of volcanic origin. Carriacou, Union, and Canaguan are the largest, and they yield coffee, cotton, sugar, and indigo. Pop. 8000.

Grenelle, a suburb of Paris, France, on the Seine, famous for its artesian well, which supplies water to the upper part of the city. The well has a depth of 1704 ft. and a temperature at the bottom of 82°-85° F.

Grenfell, Bernard Pyne (1869-1926), English Egyptologist, b. in Birmingham, son of John Granville G.;

educated at Clifton College and at Queen's College, Oxford. In 1894 he began excavations in Egypt, and, in collaboration with Mr. Hunt, published his important discoveries of ancient papyri, including *Sayings of our Lord* and *New Sayings of Jesus*. A fellow of the British Academy, and from 1908 Professor of Papyrology at Oxford University. His publications include: *The Revenue Laws of Ptolemy Philadelphus*, 1896; *An Alexandrian Erotic Fragment*, 1896; and, in conjunction with Mr. Hunt: *The Geneva Fragment of Menander*, 1898; *The Amherst Papyri*, 1900-1; *The Tebtunis Papyri*, 1902; and *The Hibeh Papyri*, 1906.

Grenfell, Francis Wallace, Baron (1841-1925), British general, b. in London. He was educated at Blandford, and entered the army in 1869, attaining the rank of captain in 1871. He served in the Kaffir War, 1878, and in the Zulu War, 1879. During the war in the Transvaal, 1881-82, he served as assistant quartermaster-general under Sir Evelyn Wood. He distinguished himself in the Egyptian War, fighting at Tel-el-Kebir in 1882. He took part in the Nile Expedition, 1884; and was sirdar of the Egyptian army, 1885-92. He commanded the operations at Suakin, 1888, and won the battle of Toski, 1889. From 1894 to 1897 he was at the War Office as inspector-general of auxiliary forces. In the latter year he again took command in Egypt, and he was commander-in-chief and governor-general of Malta, 1899-1903. He commanded the 4th Army Corps, 1903-4, and the forces in Ireland, 1904-8. He was created first Baron G. of Kilvey in 1902, and made field-marshal in 1908.

Grenfell, George (1849-1906), an English explorer and missionary, b. at Lanced in Cornwall. In 1874 he went to Kamerun under the Baptist Missionary Society, and with Comber explored the country. Four years later he went to the Congo to make an extensive survey, and in 1885 explored the Ubangi R. During 1891-92 he served on a commission as a delegate of the Congo Free State to determine the boundary line between that country and the Portuguese territory. Consult Johnston, *George Grenfell and the Congo*, 1908, and Hawker, *Life of George Grenfell*, 1909.

Grenfell, Julian Henry Francis (1888-1915), Eng. soldier and poet; b. March 30, in London, eldest son of first Baron Desborough. Educated Summer Fields; Eton; Balliol College, Oxford. He passed, 1910, into the army, first of all university candidates; and went to India to join the 1st Dragoons, with which

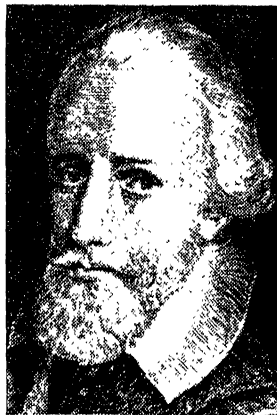
corps he went to S. Africa, 1911. He next saw England Sept. 20, 1914, and left for Flanders Oct. 5. Twice mentioned in dispatches, returned on a week's leave in Dec., with D.S.O. He had another week at end of Jan. 1915. He was wounded in the head by a shell near the Ypres-Menin Road, May 12; was taken to hospital in Boulogne, where he died May 26. He was over 6ft. high, full of enthusiasm and vague ideals, which embraced religion and a love of war. In the year of his death he had written the sounding poem *Into Battle*. There is as yet no published collection of his works.

Grenfell, Sir Wilfred Thomason (b. 1865), Brit. medical missionary, whose name is inseparably associated with the development and well-being of Labrador, in the future of which country he has an intense belief. Born at Parkgate, Cheshire; educated at Marlborough and Oxford; studied medicine at the London Hospital, being house-surgeon to Sir Frederick Treves. First visit to Labrador began with a cruise as medical missionary with the Royal National Mission for Deep Sea Fishermen; and in 1892 he went to Labrador as permanent medical missionary. His valuable pioneering work there has greatly improved the lot of the local fishermen. He has built hospitals, nursing stations, orphanages, schools and stores in Labrador. He owns and operates steamships and yawls in connection with his various hospitals, and is himself surgeon-in-chief and master of a hospital steamship which cruises the coasts of Labrador. In 1912 he opened the King George V. Seamen's Institute, the foundation stone of which was laid by King George by electric message from England. In the Great War he was with the Harvard Surgical unit in France. Essentially of the pioneering temperament, the effectiveness of his work is enhanced by an attractive and strongly individual personality. Eloquent voices the charms of Labrador both by word and pen. Among his numerous works are *Vikings of To-Day*, 1895; *The Harvest of the Sea*, 1905; *Labrador: the Country and its People*, 1909 (new edition, 1922); *Autobiography of a Labrador Doctor*, 1919; *Labrador Looks at the Orient*, 1928. In 1920 he was awarded the gold medal of the National Academy of Social Sciences of America, and in 1930 the Livingstone gold medal of the Royal Scottish Geographical Society. See J. B. Mathews, *Wilfred Grenfell: Master Mariner*, 1924; F. L. Waldo, *Grenfell: Knight-Errant of the North* (Philadelphia), 1924.

Grenoble (ancient *Gratianopolis*), the former cap. of the Dauphiné, now a first-class fortress and chief city of the dept. of Isère in S. France, 60 m. S.E. of Lyons. Its bishopric was founded in the fourth century; there are many interesting buildings, including the fifteenth-century cathedral of Notre Dame and the Gothic palais de justice. The town has a university of three faculties, with a magnificent library. The chief manufactures are kid gloves, liqueurs, paper, cement, hats, and artificial flowers, and considerable trade is done in walnuts, grain, and cheese. Silk spinning and iron founding are also carried on. See Pitot's *Histoire de Grenoble*, 1843-46. Pop. 77,409.

Grenville, George (1712-70), an Eng. statesman, educated at Eton and Christ Church, Oxford. He sat in parliament as member for Buckingham from 1741 till his death. After having held various offices, he became Secretary of State, 1762; First Lord of the Admiralty, 1762-63; Chancellor of the Exchequer, First Lord of the Treasury, and Prime Minister, 1763-65. His ministry is especially remembered for the prosecution of Wilkes and the passing of the American Stamp Act, 1765. Consult *The Grenville Papers*, 1852-53, and E. D. Adams, *Influence of Grenville on Pitt's Foreign Policy*, 1904.

Grenville (or Greynville), **Sir Richard** (c. 1541-91), a famous Eng. sea-



SIR RICHARD GRENVILLE

man, of an ancient Cornish family. He commanded Raleigh's expedition to Virginia of 1585-86, and was in command of the *Revenge* in the fight

with the Spanish fleet off Flores in the Azores, and died on board the enemy's flag-ship, *San Pablo*. Consult Sir Walter Raleigh, *The Truth of the Fight about the Isles of Azores*, 1591; Gervase Markham, *The Most Honourable Tragedie of Sir Richard Grenville, Knight*, 1595; Froude's essay in *Short Studies on Great Subjects*; and Tennyson's ballad, *The Revenge*.

Grenville, Richard (1797-1861), see BUCKINGHAM AND CHANDOS.

Grenville, William Wyndham, Baron (1759-1834), an Eng. statesman, son of George G. He was educated at Eton and Christ Church, Oxford, and entered parliament as member for Buckingham in 1782. He became secretary to his brother, Earl Temple, then Lord-Lieutenant of Ireland, and Paymaster-General of the Army under his cousin, William Pitt. He was appointed in succession Speaker of the House of Commons, 1789; Secretary of State for the Home Department, 1789; Foreign Secretary, 1791. Pitt and his colleagues resigned office in 1801, on George III.'s refusal to pass the Catholic Emancipation Bill. G. formed part of the short-lived gov. of 'All the Talents,' 1806-7. He edited Chatham's letters to his nephew, 1804, and wrote *Nugæ Metrice*, 1824.

Gresham, Sir Thomas (1519-79), an Eng. merchant, founder of the Royal Exchange. He was apprenticed to his uncle, Sir John G., a London mercer, and in 1543 was



SIR THOMAS GRESHAM

admitted a member of the Mercers' Company. He held the post of 'king's merchant' in Antwerp from 1551 to 1567. For a short while he acted as Queen Elizabeth's ambassador at Brussels (1559). During

1566-71 he erected the Royal Exchange on the model of the one in Antwerp, and left a large sum of money to endow a college with seven lectureships. His house in Bishopsgate Street was converted to this purpose, and in it lectures were given from 1597 to 1768. Consult Dean Burgon, *Life and Times of Sir Thomas Gresham* (2 vols.), 1839.

Gresham's Law was first so called by Macleod in 1857, on the understanding that the principle 'bad money drives out good' was first expounded by Sir Thomas Gresham to Elizabeth in 1558. Early economic writers, such as Copernicus, had, however, already explained it. The principle is that the worst form of currency will be most used in circulation, and the more valuable tend to disappear. Thus, if there are two metals in circulation, the one which costs least in production will predominate. The law also applies where there is debased coinage in circulation with full-weight coinage, and metallic currency with inconvertible paper money.

Gresset, Jean Baptiste Louis (1709-77), a Fr. poet and dramatist, b. at Amiens, where he was brought up by Jesuits. In 1725 he was sent to the Collège Louis le Grand in Paris, and subsequently received an appointment as master in a college at Rouen. In 1734 he published his delightful poem, *Vert Vert*, of a convent parrot, which having fallen among profane wayfarers, shocks the nuns and is returned in disgrace to his original convent. There he repents of his sins and is forgiven. G.'s reputation was made, and he returned to Paris, where he published a second poem, *La Chartreuse*, followed by *Carême impromptu*, and *Lutrin Vivant*. He produced a tragedy, *Edouard III.*, 1740, and two comedies, *Le Méchant* and *Sidnei*, 1745. He was expelled from his order for the ridicule he poured on monks and nuns in *Vert Vert*, and bitterly repented its publication. He was admitted to the Academy, 1748. Consult A. A. Rénouard's edition of his poems, 1811, and his *Life* by St. Albain Berville, 1863, and by Jules Wogue, 1894.

Greta Hall is situated in the Vale of Keswick, Cumborland, and consists of two houses under one roof. Cole-ridge took up his residence (1800-3) in one half, and in 1803 Southey occupied the other till his death in 1843.

Gretna Green, a vil. in Dumfriesshire, Scotland, 9 m. N.N.W. of Carlisle. It was formerly notorious for the clandestine marriages which were, after the abolition of Fleet marriages (1754), held here, as being the nearest place within the Scottish

borderline. In 1856 a law was passed requiring one of the parties to reside in Scotland for three weeks previously. A collision between two passenger trains and a troop 'special' occurred here on the Caledonian Railway on May 22, 1915, involving 227 deaths, of which 3 were officers and 215 other ranks. See P. O. Hutchinson's *Chronicles of Gretna Green*, 1844. Pop. 2969.

Grétry, André Ernest Modeste (1741-1813), a Fr. operatic composer; comedy was his forte, and his efforts in this direction won for him a very wide contemporary reputation, which has, however, diminished considerably, although he is regarded by musical historians as the originator of the modern type of Fr. comic opera. His operas number about fifty, the best being: *Le Tableau Parlant*, 1769; *L'Amant Jaloux*, 1778; *Le Caravane de Cairo*, 1783; and, perhaps his finest achievement—certainly his most popular one—*Richard Cœur de Lion*, 1784. He also made some early attempts at symphonic works, and later published sundry writings on musical and dramatic æsthetics and a treatise on harmony, all of which met with the small success they deserved.

Greuze, Jean-Baptiste (1725-1805), a Fr. genre and portrait painter, *b.* at Tournus, near Mâcon, in Burgundy; studied in the Academy at Paris. His first picture, 'Le Père de famille expliquant la Bible à ses enfants,' was so good that his teachers doubted whether it was his sole production. His success, however, was followed up, and he won great popularity, especially for his pretty heads of young girls. He was elected to the Academy in 1769. His chief works are: 'Aveugle trompé,' 1755; 'La Jeune Fille à l'agneau'; 'La Jeune Fille qui pleure le mort de son oiseau,' etc. See *Monograph* by Normand, 1892.

Greville, Charles Cavendish (1794-1865), an English diarist; educated at Eton and at Christ Church, Oxford. He became private secretary to Earl Bathurst and clerk of the Council in Ordinary (1821-60), during which time he made excellent use of his opportunities for studying court and political life. He left his journal to Henry Reeve, with the request that it should be published soon after his death. Accordingly, instalments appeared in 1875, covering the years 1820-37; in 1885, covering 1837-51; and the third portion, 1852-60, in 1887. These *Memoirs* are of great value to students of nineteenth-century history.

Greville, Sir Fulke, Lord Brooke (1554-1628), an English poet, *b.*

at Beauchamp Court, Warwickshire. He was educated at Cambridge and Oxford, and travelled abroad; entered the court of Queen Elizabeth in 1577. He was a friend of Sir Philip Sidney, whose Life he wrote (posthumously published in 1652). G. wrote a tragedy, *Mustapha*, in 1609, some sonnets, and a considerable number of laboured didactic poems. He was Chancellor of the Exchequer from 1614 to 1621, and was killed in a quarrel with his serving-man. See Grosart, *The Friend of Sir Philip Sidney*, 1894; and his edition of *Greville's Collected Works*, 1870.

Gréville, Henry, see DURAND, ALICE.

Grévy, François Paul Jules (1807-91), President of the French republic, *b.* at Mont-sous-Vaudrey, Jura, and studied law in Paris, becoming an advocate in 1837. In 1848 he was elected by the republicans of his department to the constituent assembly, of which he became vice-president. He vigorously opposed the second empire under Louis Napoleon, and confined his attention to the Bar till 1868, when he was returned as deputy for the Jura, and was elected president of the national assembly in 1871, being re-elected in 1876, 1877, and 1879. On the resignation of Marshal MacMahon in 1879, he was elected president of the republic. In 1885 he was re-elected for a further period of seven years, but, on the discovery of his son-in-law Daniel Wilson's dishonest traffic in the decorations of the Legion of Honour, he was obliged to resign office. See his *Discours politiques et judiciaires*, edited by L. Delabrouse (2 vols.), 1888; and his Life, by Barbou, 1879, and by Bertrand, 1892.

Grey, Albert Henry George, fourth Earl (1851-1917), British administrator; *b.* Nov. 28, the son of General Hon. Charles G. He was educated at Harrow and at Trinity College, Cambridge, and entered parliament as Liberal member for S. Northumberland in 1885. He succeeded his uncle in the earldom, 1894. In 1896-7 he was Administrator of Rhodesia, where he was associated with Cecil Rhodes. He was director of the British South Africa Company 1898-1904, and Lord-Lieutenant of Northumberland, 1899-1904. He succeeded the Earl of Minto as Governor-General of Canada, 1904-11. He published: *Hubert Hervey, a Memoir*, 1899. Died at Howick House, Lesbury, Northumberland, Aug. 29.

Grey, Charles, second Earl (1764-1845), an English statesman, *b.* at Falloden, Northumberland, and educated at Eton and Cambridge. In 1786, he was returned by Northumber-

land to parliament in the Whig interest; he vigorously opposed the policy of William Pitt, associating himself with Fox, Burke, and Sheridan as one of the managers of the impeachment of Warren Hastings. On Burke's supporting the government in declaring war upon France during the Revolution, G. remained faithful to his leader. He was one of the founders of the Society of the Friends of the People, and asserted that parliament did not represent the nation. He moved the impeachment of Pitt (1797), and took part in the secession of the Whigs as a protest against his policy. On the formation of the Fox-Grenville ministry, he was appointed First Lord of the Admiralty (1806), and, on the death of Fox, Foreign Secretary and leader of his party. During his ministry, Wilberforce's Act abolishing African slavery was passed (1807). In that year his ministry retired and he led the Opposition till 1830, when he became Premier and First Lord of the Treasury. During this term of office the great Reform Bill went through all its readings, and passed the House of Lords in 1832. In 1834 he resigned office on the Irish question, and retired from public life. Consult his *Correspondence with William IV.*, 1867; *Correspondence with Princess Lieven*, 1890; and the *Life*, written by his son, Charles Grey, 1861.

Grey, first Viscount, Edward of Fallodon, Lord Grey, (b. 1862), an English statesman, the grandson of

parliament in 1885, representing Berwick-on-Tweed in the Liberal interests. During the Rosebery administration (1892-95), he was appointed Under-Secretary for Foreign Affairs. From 1905 until 1916 he was Secretary for Foreign Affairs, and received for his distinguished services the K.G. in 1912. He was largely responsible for the successful conclusion of the negotiations following the Balkan War of 1912-13, at the termination of which the Peace of London was signed in 1913. In April 1914 he accompanied the King and Queen on their state visit to Paris. As Foreign Secretary during the fateful months of July and Aug. he strove to avoid the disaster of the Great War. In a White Paper which he issued he reveals the strain of the anxieties which, during that time, beset his office. He had a firm belief in the efficiency of Conferences in settling disputes, whether local or international, and had on more than one occasion demonstrated their success. That he failed to persuade Germany in 1914 to similar recourses was due to the determined aggression of the Ger. War Lords, which was calculated to override the pacific counsels of the ablest statesmen of any time. The tragic failure, however, was to reap its harvest indirectly in the formation of the League of Nations. For President Wilson's convictions were greatly strengthened by the unflagging fervour of Lord Grey, who saw embodied in the project so many of his own ideals. In 1915 he was raised to the Peerage as Viscount Grey of Fallodon, and retired from the Foreign Office on the fall of the Coalition ministry. During his long term of office he had shown an unswerving devotion to the highest conceptions of honourable conduct. Indeed he has been criticised for his aloofness from those suave veiled artifices which are claimed to be necessary to diplomacy. But by the greater number of his countrymen he is regarded as the most distinguished statesman of his day.

In 1918 he went to the U.S.A. as Ambassador until Jan. 1920, during which period he issued his pamphlet on the 'League of Nations.' Ever since, in 1916, he had informed President Wilson through Col. House (q.v.) that the existence of a permanent European Conference during 1914 would have made the Great War impossible, his ardour for settlement, by a League or Union, of problems had increased and he became an enthusiastic member as soon as the League of Nations was formed, serving it by writing and on the platform. From 1920 to 1924 he held the



LORD GREY OF FALLODON

Sir George G., Gladstone's colleague. He was educated at Winchester and at Balliol College, Oxford, and entered

leadership of the Liberal party in the House of Lords. In 1925 he published his reminiscences under the title of *Twenty-five Years*. In 1928 he was elected Chancellor of Oxford University, and in the same year suffered a tragic bereavement in the sudden death of his wife, whom, as Lady Glenconner, he had married in 1922. In spite of his undoubted gifts he was never happy in parliamentary life; he lacked the disposition which enjoys the fray and the prominence. His other interests are angling, in which he is expert and an acknowledged authority, tennis, at which he is a past champion, and wild bird sanctuaries. Author of *Fly-Fishing*, 1899.

Grey, Sir George (1799-1882), an English statesman, the nephew of Earl Grey, the Liberal statesman. He was b. at Gibraltar, and was educated at Oriel College, Oxford. He represented Devonport in parliament from 1832 to 1847, and became Under-Secretary for the Colonies in 1834. He was appointed Judge-Advocate (1839), Chancellor of the Duchy of Lancaster (1841), and, during Russell's ministry, Home Secretary (1846). He was not a brilliant speaker, but showed much practical ability during the Chartist riots and the Fenian activity in Ireland. He carried successively through parliament the Crown and Government Security Bill and an Alien Bill; he remodelled the ticket-of-leave system, amended the Parliamentary Oath Act, helped to stamp out the cattle plague, and for a time secured the suspension of the Habeas Corpus Act in Ireland. Under Lord Palmerston he was Home Secretary (1855), Chancellor of the Duchy of Lancaster (1859), and Home Secretary again in 1861. See *Memoirs* by Creighton (1884).

Grey, Sir George (1812-98), Governor of New Zealand. He was b. at Lisbon, and was educated at the Royal Military College, Sandhurst. He entered the army in 1829, and attained his captaincy in 1837, when he sent in his papers. From 1837 to 1840 he explored the N.W. region of Australia for the Royal Geographical Society, publishing the results of his travels in *Journals of Discovery in Australia*, 1841. In 1841 Lord John Russell appointed him governor of S. Australia. He reduced the public expenditure, and showed such wisdom in his government of the young colony that in 1846 he was sent as governor to New Zealand, in order to conciliate the Maori chiefs, who were at the time in open rebellion. He succeeded in establishing peace and won the admiration of

the natives. In 1854 he was appointed governor and commander-in-chief of the Cape of Good Hope, and had to use all his tact and firmness in allaying the discontent left after the Kaffir War. In 1858, however, the Colonial Office objected to some measures of G., who thereupon resigned office. Feeling in his favour was high at the Cape, and he resumed office. In 1861 he was a second time sent to New Zealand to bring the native war to an end. He resigned in 1867 on some point of difference between himself and the Colonial Office, and entered the New Zealand Legislature in 1874, becoming Premier in 1877. He advocated many reforms, including manhood suffrage, and had great influence with all parties. His publications include *Polynesian Mythology*, 1855, and *Proverbial Sayings of the Ancestors of the New Zealand Race*, 1858. Consult his Life by Rees, 1892, and J. Collier, 1909.

Grey, Henry George, third Earl (1802-94), an English statesman, b. at Howick, in Northumberland. As Viscount Howick he entered the House of Commons, became Colonial Secretary (1846-52) in Russell's cabinet, and published a defence of his colonial policy, entitled *Colonial Policy of Lord John Russell's Administration* (1853). He also wrote weighty letters to the *Times*, and an *Essay on Parliamentary Government as to Reform*, 1858, and edited his father's *Correspondence with William IV.*, 1867.

Grey, Lady Jane (1537-54), the 'nine-days' queen' of England, and



LADY JANE GREY

great-grand-daughter of Henry VII. She was b. at Bradgate in Leicestershire.

tershire. In 1553 Lord Northumberland forced her into marrying his fourth son, Lord Guildford Dudley. On the death of Edward VI. she was proclaimed Queen Jane on July 10, 1553. Meanwhile Mary advanced upon London, and Northumberland was too faint-hearted to oppose her. On July 19 Jane found herself a prisoner in the Tower, and on Feb. 12, 1554, was beheaded on Tower Hill on a charge of high treason. She was an exceedingly accomplished scholar, was well versed in feminine accomplishments, and was of a happy and gentle disposition. Consult J. G. Nichols's edition of *The Chronicles of Queen Jane*, 1850; J. A. Taylor, *Lady Jane Grey and her Times*, 1908; and R. Davey, *The Nine-Days' Queen*, 1906.

Grey, Zane, American author, b. Jan. 31, 1875, at Zanesville, Ohio; son of Lewis M. Grey. Educated: Zanesville High School, and University of Pennsylvania. Practised as dental surgeon in New York, 1898-1904; since then has lived by literature—chiefly novels. Has published about forty volumes. Sport and the Wild West, both of which he understands, form the staple of his writings—from *Betty Zane* (1904) to *The Shepherd of Guadalupe* (1930).

Greyfriars, a church in Edinburgh which dates back to the fifteenth century. It was the scene of the betrothal of the Prince Royal of Scotland (afterwards James IV.) to Cecilia of England, 1474; and the National Covenant was first subscribed here, 1638, when the aggressive measures of Charles I. roused to arms the whole of Scotland. The church was desecrated by Cromwell's soldiers in 1650, and in 1679 its burying-ground was used as a prison for some of the unhappy Covenanters, the Martyrs' monument bearing witness to the fact. A new church, since denominated New G., was built in 1721. Among distinguished incumbents was William Robertson, the eminent historian, who was appointed in 1761; and Scott, who from youth to manhood was a sinner in Old G., in his novel *Guy Mannering* introduces this old church and relates how, when Colonel Mannering came to Edinburgh to consult Councillor Pleydell, the latter conducts him to 'the Greyfriars, to hear our historian of Scotland, of the Continent, and of America preach.' Old G. was destroyed by fire in 1845, but has since been repaired at a considerable cost. Its burying-ground contains the tombs of George Buchanan, George Heriot, Allan Ramsay, James Borthwick, Duncan Ban MacIntyre, and Sir Walter Scott's family.

Greyhound, a breed of dogs of great antiquity, found from the earliest times in Eastern Europe and Asia, while many Egyptian monuments are ornamented with unmistakable representatives of the modern G. They are characterised by their long and narrow muzzles, slight build, and elongated limbs, and small ears falling at the tips, but they differ greatly in the length of their hair. They hunt almost entirely by sight, the sense of smell being defective. The long, slender skull points to affinity with the wolf. The English G. is the best-known of the group, and has sometimes been regarded as the parent of the others. It can readily be distinguished from all other dogs by its slender form, smooth hair, and rat-like tail, as well as by its comparatively large size. It is thoroughly adapted for extreme speed, the long tail being used as a balance for the body during quick turns, while the slender limbs with wire-like muscles give the greatest possible length of stride and offer the least possible resistance to the air. The favourite colour is a uniform sandy or pale grey tone, but the colour is of very little importance in comparison with the capacity for speed. The Italian G. is kept purely as a pet and is a miniature of the English variety; its proportions are most elegant and its speed considerable, but it is so delicately made that it is almost unable to pull down even a rabbit. The eyes are larger and softer than in the English type, and the most valued are a golden-fawn in colour. The Scottish deerhound is a larger and heavier variety of the English G., with rough and shaggy hair; it used to be employed both for coursing and deer-stalking, and the twofold use has given rise to different strains of the breed. The Irish wolf-dogs are now extinct, but seem to have had characteristics of the G. Other varieties are the Grecian, Persian and Russian Gs., and several Oriental types characterised by their silky hair.

Greyhound Racing, a term generally used to describe a race of greyhounds in pursuit of a mechanical hare. Coursing (*q.v.*) is also a form of G. R. The sport first became popular in America, and then rapidly spread to other countries, though it is claimed that the use of mechanical devices for greyhound races was practised in England long before the Americans popularised it. By means of a clever device, a mechanical imitation of a hare is made to move around a track, and as it passes the starting post, the competing hounds are simultaneously released. The races are usually over

distances of about a quarter to a third of a mile, and as there is little chance of the dogs overtaking the 'hare,' the contest becomes entirely a competitive race between the canine entrants. During 1926-27 this racing became extraordinarily popular in Great Britain, attracting not only the attention of sporting men, but also of company promoters, with the result that large sums of money were invested by the public in enterprises, the majority of which were hopeless ventures or daring impositions. The sport was swiftly seized upon by bookmakers as a great opportunity for extending their operations. The fact that the contests could take place quite near huge centres of population and during the evenings made it possible for vast numbers of persons to attend. Complaints arose that many of the methods of fraud, which the Jockey Club had more or less successfully countered during many years on the Horse-Racing Course, were practised with impunity in G. R., there being no body whose authority was sufficiently well recognised to prevent such attempts. The method most commonly practised was to run under a new name and ownership a champion dog of known swiftness to secure the consequent advantages in betting prices, and thereby obtain profits unfairly. Such difficulties, however, were gradually met by the use of more careful methods at the better-managed tracks and by the establishment of the National Greyhound Racing Association, under the control of a committee of persons of known integrity and responsibility, who issued rules based on and similar to the regulations the Jockey Club insists upon in horse-racing. This Association issues licences to the proprietors of tracks, and although there is no necessity for the owners of a track to apply for a licence nor abide by the rules, the advantages of doing so are obvious. The popularity of the sport can be measured by the fact that during 1929 nearly eight million persons paid for admission to six London tracks alone. The Totalisator (*q.v.*) has been installed in some places. Many tracks are now equipped with a course for Motor Dirt Track Racing, on evenings that are not occupied by G. R.

Greymouth, a tn. and seaport of New Zealand, in Grey co., 105 m. N.W. of Christchurch. It is noted as the port of a gold and a coal field, and there are three government railway wharves. The depth of the bar is 17 ft. at high water and 7 ft. at low water. It has a growing timber trade. Pop. 4600.

Greys, Scots, a famous Scottish regiment, and the only surviving distinctively Scottish cavalry regiment. It dates its origin from the religious troubles in Scotland during the reign of Charles II., when, owing to the growing opposition of the persecuted Covenanters, the Scottish gov. deemed it advisable to increase its military strength. Accordingly three troops of Dragoons were raised in 1678 for the standing army, three more being added in 1681, when the whole six were regimented as the 2nd Regiment of Dragoons, known later as the Scots Greys, from the colour of the tunic. Their first colonel was the original commanding officer of the first troop, Sir Thomas Dalziel, the strange enthusiast who never cut his beard nor altered the fashion of his uniform from the time of the execution of Charles I. The regiment served in Flanders under William III. from 1694 to 1697, and in all Marlborough's famous battles. At Ramillies they assisted in the capture of the Fr. Régiment du Roi with its colours. They fought at Sheriffmuir and at Fontenoy, and won fame at Waterloo for an historic charge. After Waterloo came a long spell of inactivity, but in the Crimea they earned the special commendation of Sir Colin Campbell for their part in the charge of the Heavy Brigade at Balaklava under Sir John Scarlett. They were also in the Egyptian War 1884-5, and in the South African War 1899-1902. In the Great War the S. G. were in the cavalry operations during the Mons retreat and in the subsequent advance from the Marne to the Aisne. Afterwards they fought more often as dismounted troops in the Ypres area, notably in the bitter fighting of Oct. 1914 around Gheluvelt. They were also among the troops which defended Hill 60, and in the fighting at Messines and Wytshacte, and on the Somme, both as mounted and dismounted troops, in the final Ger. offensive of 1918.

Greytown: (1) Called also **San Juan del Norte**, a tn. and port of Nicaragua on the Caribbean Sea, at the mouth of the San Juan R. It is a port of call for mail packets, and monopolises the import and export trade of the country. The principal exports are bananas, coconuts, tortoise-shell, mahogany, india-rubber and hides. The harbour, once very fine, is now badly silted up. A vast breakwater has been erected pending the construction of a Nicaragua Canal. Pop. 2500. (2) A tn. of Natal in the Umvoti Valley, 65 m. S.W. of Pietermaritzburg. Pop. 1650.

Griboyedov, Alexander Sergievitch

(1795-1829), a celebrated Russian poet and dramatist, b. at Moscow. He served for a time in the army, but entered the civil service in 1817, and was appointed secretary of the Russian legation in Persia in 1818. In 1828 he became minister-plenipotentiary to Persia, but in 1829 the populace of Teheran, incensed against the Russian embassy, attacked the house and assassinated the minister. He began his literary work with a comedy, *The Young Spouses*, in 1816, but his great work, *Goré of uma*, or *Misfortune from Intelligence* (Eng. trans. 1857), a satirical comedy upon Russian society, was rejected by the censorship, and was not published until 1833. He left unfinished a romantic drama, *A Georgian Night*.

Grieg, Edward Hagerup (1843-1907), a Norwegian composer and pianist. His music is intensely national in character and is mostly lyrical. The piano concerto, Op. 16 is perhaps his best composition. His works for pianoforte solo include a great number of lyric pieces, an early sonata, a ballade in variation form and the famous 'Holberg' suite. In chamber-music he has written two indifferent string quartets; three sonatas for violin and piano, of which the later two rank amongst his finest achievements; and an excellent sonata for 'cello and piano, whilst, of his numerous songs, the settings, particularly of Hans Andersen and Björnson, are exquisitely poetic.

Grierson, Sir George Abraham, scholar and authority on the languages of India, b. Jan. 7, 1851, at Glenageary, co. Dublin; eldest son of Geo. Abraham G., LL.D. He was appointed a member of the Indian Civil Service, 1873; and after holding various government offices became director (1898-1903) and superintendent of the Linguistic Survey of India. Among his publications are: *Grammar and Chrestomathy of the Maithili Language*; *Seven Grammars of the Bihari Dialects*, 1883-4; *Bihar Peasant Life*, 1885, with some valuable illustrations; *Modern Vernacular Literature of Hindustan*, 1889; *The Satsaiya of Bihari*, 1896; *Essays on Kashmiri Grammar*; *Linguistic Survey of India*, 1898-1904; *Pisaca Languages of North Western India*, 1906; and *Manual of the Kashmiri Language*. K.C.I.E., 1912. O.M. 1928.

Grierson, Sir Robert (1655-1733), Laird of Lag, was the great persecutor of the Covenanters. He was especially active in helping to put down conventicles, and in enforcing the Test Act, using all kinds of severity to gain his ends. He succeeded, in fact, in making his name a byword for all

that was cruel. He was also one of those to condemn the Wigtown martyrs. In 1685 he was made a Nova Scotia baronet. After the Revolution he was several times fined and imprisoned. He is the original of Scott's *Sir Robert Redgauntlet*. See Lt.-Colonel Alexander Fergusson's *Laird of Lag*, 1885.

Griesbach, Johann Jacob (1745-1812), German biblical critic, b. at Butzbach in Hesse-Darmstadt. The great work with which his name is associated is his critical version of the text of the N.T. (1774-5), the most remarkable feature of which was his division of the MSS. into three groups: (1) the Alexandrine recension; (2) the Latin or Western recension; (3) the Byzantine or Eastern recension. His other works are: *Synopsis Evangeliorum*, 1774-5; *Populare Dogmatik*, 1779; and *Opuscula Academica* (ed. Gabler), 1825. See *Life by Köthe*, 1812; also *BIBLE*.

Griesheim: (1) A small market tn. of Germany, situated in the Republic of Hesse, about 5 m. W. of Darmstadt. Pop. about 7000. (2) A small tn. of Prussia, in the prov. of Hesse-Nassau, situated on the Main, about 4 m. W. of Frankfort-on-the-Main. Pop. 12,000.

Griffin, a city of Georgia, U.S.A., 40 m. S. of Atlanta, and the cap. of Spalding co. Here is situated the state agricultural experiment station, and there is an important cotton and fruit trade. Pop. 10,321.

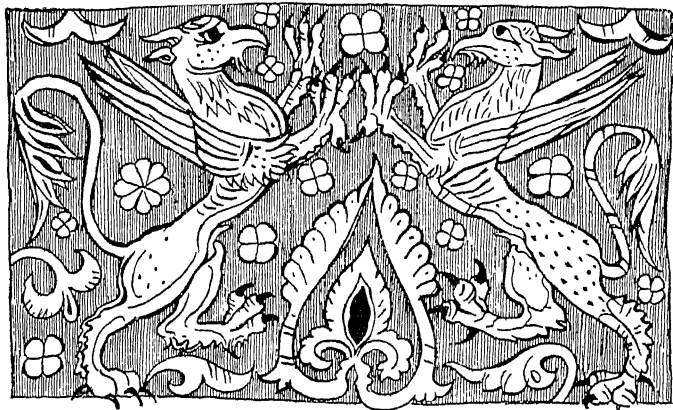
Griffin or Griffon, a mythological beast used in architectural decoration and as a charge in Heraldry (*q.v.*). It is the oldest and most common of the outlandish monsters used in heraldic devices, having the hinder parts of a lion with the fore-parts, head and shoulders, wings and fore-legs of an eagle. When the head alone is borne it can be distinguished from that of the eagle by the long tuft under the beak and the pointed ears. The 'griffin rampant' was taken as a quartering by the family of Montague at a very early date.

Griffin, Gerald (1803-40), an Irish novelist and dramatic writer, b. at Limerick. After great hardships he succeeded with *The Nymphs*, an opera entirely in recitative, in bringing himself into public notice. His tragedies were entirely unsuccessful, but he attained great popularity by the *Holland Tide Tales*, 1827, followed by *Tales of the Munster Festivals*, 1827; and the fine novel *The Collegians*, 1829, which Dion Boucicault adapted for the stage under the title of *The Colleen Bawn*. Among his other novels are, *The Invasion*, 1832; *Tales of my Neighbourhood*, 1835; *The Duke of Mon-*

mouth, 1836, and *Talis Qualis*, or *Tales of the Jury-room*, 1842. In 1838 he joined the Society of the Christian Brothers at Dublin, whence he removed to the North monastery, Cork, where he *d.* of typhus.

Griffith, Arthur (1872-1922), Irish patriot; *b.* in Dublin; son of Arthur G., printer. Educated at a Christian Brothers school in Dublin. Became a compositor. Joined the Gaelic League when it was formed; also the Celtic Literary Soc., and the Irish Republican Brotherhood. Went to S. Africa, 1896, became a surface-worker on the Rand. Returned to Dublin, 1898. With Wm. Rooney, he established the *United Irishman*

Eire. On the rise of the Irish Volunteers as a counter-stroke to the Ulster Volunteers, G. was active on their side, and assisted in the gun-running at Howth in July 1914. *Eire*, suppressed, was succeeded by *Scissors and Paste*. Although G. took no part in the rising of Easter 1916, he was interned with the leaders of that revolt at Frongoch, Wales. In July 1917, when he and they were again at liberty, De Valera was elected leader of Sinn Féin, on the motion of G. G's. paper came out again as *Nationality*; and again, as *Eire Og* (Young Ireland). While they were undergoing a term of imprisonment in 1918, De Valera and G. were



GRIFFINS IN A FIFTEENTH-CENTURY HERALDIC PANEL

weekly, in 1899; and on Rooney's death in 1901 he became its sole director. It was an unprofitable, brilliant, literary paper. G. at length left the I.R.B., and began to preach a policy of passive resistance to British rule in order to obtain Dominion status for Ireland. In Oct. 1902, an organisation based on his policy, and called Cumann na Gaedhal, was founded—with the watchword 'Sinn Féin' (pronounced, approximately, *Shin Fane*), or 'We ourselves'; in other words, Direct Action; it soon became the name of the party. The movement progressed rapidly in Dublin; it was slower in taking hold of the country. Libel actions and other incidents caused repeated changes in the name of the paper G. directed. In 1906 it became *Sinn Féin*, which for a little while was a daily. Next it was

elected president and vice-president respectively of an Irish republic. The terrorist period of the Black-and-Tans followed. G. was again in prison in 1920. Owing to the refusal of De Valera to compromise with the British gov. in July 1921, G. replaced him as revolutionary president and deputed Michael Collins (*q.v.*) to act for the party in negotiations with Great Britain. G. was elected first president of the Irish Free State (*q.v.*). When Dáil Éireann had declared for the Treaty, G. had the task of suppressing the rebellion of irreconcilables. Just when he had succeeded in this, he fell in a faint when leaving a private hospital in Lower Leeson Street, Dublin; he was carried back and *d.* there an hour or so later, Aug. 12. He wrote no book; but a pamphlet of his, *The Resurrection of Hungary*,

1905, must have stimulated the national movement in Ireland.

Griffith, William (1810-45), an English botanist, b. at Petersham, Surrey. He studied for the medical profession at University College, where he was a pupil of Dr. Lindley. His first public work appeared in Dr. Wallich's *Plantæ Asiaticæ rariores* in 1832; in the same year he sailed for India, and was appointed assistant-surgeon in the service of the East India Company. In 1835 he formed one of an expedition to inspect the tea-forests of Assam, which was the first of many such journeys and resulted in enormous additions to the botanical and geological knowledge of less known districts of India, Burnah, Assam, Khorassan, Afghanistan. His most important papers were published in the *Transactions of the Linnean Society*, and his books, *Icones Plantarum Asiaticarum*, *Itinerary Notes*, *Palms of British East India*, and *Notulæ ad Plantas Asiaticas*, were published by MacClelland after G.'s death.

Griffon Bruxellois, a toy dog of terrier extraction bred in Belgium, with a rough coat, the smooth dog of the same breed being the 'petit Brabançon.' It was introduced into England in 1895. The points of the G. B. are: General appearance intelligent, sprightly, robust, and compact; head large and rounded, covered with rather coarse, rough hair; ears semi-erect when not clipped; eyes very large and black; eyelashes and eyebrows finished with long stiff black hair, nose short, black, surrounded with hair and converging upwards to meet the hair round the eyes; lips edged with a black moustache; chest rather wide and deep; legs of medium length and very straight; tail upwards, colour red; harsh and wiry coat; weight, small size, maximum, 5 lb., large size 10 lb. See James Watson, *The Dog Book*, 1906.

Grigoresco, Nicolæ Ion (1838-1907), a Rumanian painter, b. near Titu, N.W. of Bucharest. He became famous during the Russo-Turkish War (1877-78) by his fine military pieces, notably 'The Storming of Smârdan,' which is in the town hall at Bucharest, and 'Provision Transport in Bulgaria,' in the museum of Bucharest. His portrait of 'Carmen Sylva' is a fine, spirited achievement.

Grigoriopol, a tn. of the Ukraine Republic, in the district of Kherson. It is situated on the Dniester R., 80 m. N.W. of Odessa. There is a trade in wine, fruit, and tobacco, and fine leather is manufactured. Pop. 9000.

Grillparzer, Franz (1791-1872), the

greatest dramatic poet of Austria, b. at Vienna. In 1813 he was appointed a clerk in the Lower Austrian Revenue administration. In 1818, through the influence of the Minister of Finance, he was appointed poet to the Hofburg Theatre, and was promoted to the Hofkammer (Exchequer). In 1832 he was made director of archives of the Hofkammer, from which he retired with the title of 'Hofral' in 1856. He first attracted attention by his tragedy *Die Ahnfrau*, 1817, a 'fate-drama,' in the trochaic measure of the Spanish drama. In 1818 appeared *Sappho*, a drama in the classic spirit of Goethe's *Tasso*, followed by the trilogy *Das goldene Vliess*, 1821, comprising *Das Gastfreund*, *Die Argonauten*, and *Medea*, all noble pieces of work, modern in sentiment, and classical in design. His historical tragedies *König Ottokars Glück und Ende*, 1823, and *Ein treuer Diener seines Herrn*, 1826, first brought G. into conflict with the censor, a struggle which helped to embitter all this period of his life. With *Des Meeres und die Liebe Wellen*, 1831, a dramatisation of the story of Hero and Leander, he returned to the classical themes and the style of *Sappho* with an even greater measure of the Spanish grace of expression, which he borrowed mainly from Calderon. *Der Traum, ein Leben*, 1834, is his technical masterpiece, and the first of his dramas without a tragic ending. His only attempt at comedy, *Weh dem, der Lügt*, 1838, in spite of its brilliance, failed to meet the popular taste, and disgusted him for ever with the Austrian theatre. Three unpublished tragedies, *Die Jüdin von Toledo*, *Ein Bruderkwitz im Hause Habsburg*, and *Lilussa*, were found among his papers after his death. Although essentially a dramatist, his lyric poetry is of fine quality, and he left one prose masterpiece, *Der arme Spielmann*, 1848. See H. Laube, *Franz Grillparzers Lebensgeschichte*, 1884, A. Ehrhard, *Franz Grillparzer*, 1900; G. Pollak, *F. Grillparzer und the Austrian Drama*, 1907.

Grilse, see SALMON.

Grimald, Nicholas (1519-62), an English poet and theologian, b. in Huntingdonshire, and educated at Cambridge. He became a probationer fellow of Merton College, Oxford, in 1541, and chaplain to Bishop Ridley in 1547. His connection with Ridley led to his imprisonment, and he is said to have escaped only by recanting. It was at Ridley's desire that G. translated Laurentius Valla's book, the alleged *Donation of Constantine*, also Æneas Sylvius' *De Gestis Basilensis Concilii*. He is best re-

membered by his contributions to Tottel's *Songs and Sonettes*, 1557, although for some reason thirty of his forty poems were suppressed in the second edition. His poetry was modelled on Surrey's, but is inferior to it. There are two Latin tragedies of G.'s still extant: *Archipropheta sive Johannes Baptista*, 1548, and *Christus Redivivus*, 1543; and translations of Cicero's *De Officiis*, and Virgil's *Georgics*.

Grimaldi, Francesco Maria (1619-63), an Italian Jesuit and natural philosopher, b. at Bologna. He wrote a valuable work entitled *Physico-mathesis de Lumine, Coloribus, et Iride aliisque annexis*, 1665, which contains accounts of numerous experiments relating to the interferences of the rays of light. This phenomenon of interference was at the time enunciated as a proposition: 'That a body actually enlightened may become obscure by adding new light to that which it has already received.' He was also the discoverer of 'diffraction' of light, afterwards designated 'inflexion' by Newton, who also corrected his theories of the different refrangibilities of the rays.

Grimaldi, Giovanni Francesco (1606-80), an Italian architect and landscape painter, surnamed 'Il Bolognese' from his birthplace. He was a relative and pupil of the Caracci. He became architect to Pope Paul V., and was employed by Cardinal Mazarin and Louis XIV. upon architectural designs and fresco-painting in the Louvre.

Grimaldi, Joseph (1779-1837), the most famous of English clowns, b. in London, and was the son of an Italian actor. He first appeared at Sadler's Wells as an infant dancer in 1781, and in the same year he took part in the pantomime at Drury Lane. He obtained his greatest success as clown in the pantomime of *Mother Goose* at Covent Garden in 1806; a part which he constantly revived until his retirement in 1828. See his *Memoirs*, ed. by Charles Dickens (1838).

Grimm, the name of two brothers, distinguished Ger. philologists and historiologists, both b. at Hanau, and fellow-students in law at Marburg University. They were devoted friends, serving each other's interests and collaborating in many literary labours.

Jacob Ludwig Karl Grimm (1785-1863), began his literary career at Paris (1805) as assistant to Professor Savigny, a celebrated Ger. juriconsult, the founder of the 'historical school' in Germany. This work enabled G. to gain valuable insight into the 'scientific method' he later pursued in his investigations of the

Teutonic languages, which led to his becoming the founder of scientific philology and to his epoch-marking discovery known as *Grimm's Law* (q.v.), enunciated in his *Deutsche Grammatik*, the greatest work of the age in philology. While librarian at Wilhelmshöhe and then at Cassel he was able to carry on his favourite studies of philology and old and mediæval Ger. poetry. In 1811 he published his first work in the latter subject, *Ueber den Altheutschen Meistersang*. During 1827-37 he was lecturer in the Ger. language, litera-



JAKOB GRIMM

ture, and antiquities at Göttingen University. The brothers G. were among the seven professors who signed a protest against the innovations introduced into the constitution by the King of Hanover, and both suffered banishment. In 1841 he became lecturer at Berlin University. His *Kinder- und Hausmärchen*, collected and published with his brother, made fairy tales popular throughout Europe, and gave rise to the investigations which established the modern science of *Folklore*. His *Deutsche Rechtsaltertümer* and *Mythologie* treat of the society and religious superstitions of Central Europe in the Middle Ages. G. stands out among famous scholars for his stupendous learning and for the noble disinterestedness of his life and work.

Wilhelm Karl Grimm (1786-1859) was assistant librarian at Cassel and professor extraordinary at Göttingen. At Berlin he collaborated with his brother. He wrote independently *Die Deutsche Heldensage, Kämpfe, Vöser*, and many treatises on Ger. literature and antiquities.

Grimm, Friedrich Melchior, Baron von (1723-1807), a witty Ger. writer,

b. at Ratisbon and educated at Leipzig. He accompanied the young Count de Schönburg to Paris, and became reader to the young Duke of Saxe-Gotha. In 1749 he made the acquaintance of Rousseau, and became closely associated with the Encyclopædists. In the musical war between the partisans of Fr. and Italian music, G. sided with the latter and wrote in their defence a witty pamphlet, *Le petit Prophète de Boehmischbroda* (1753), followed by *Lettres sur la Musique Française*. On becoming secretary to the Duke of Orleans he wrote, in conjunction with Diderot and Abbé Ragnal, the literary bulletins containing acute criticism on Fr. literature. In 1776 he was appointed minister to the Fr. court by the Duke of Gotha, and in 1795 as minister of Russia to Hamburg by the Empress Catherine. His *Correspondance Littéraire, Philosophique et Critique* was published in 1812.

Grimma, a tn. situated in the Republic of Saxony. It stands on the l. b. of the Mulde, and is about 17 m. S.E. of Leipzig. Here is the Fürstenschule, a school founded in 1550. The people are engaged in the manufacture of iron goods and in agriculture. Pop. about 11,000.

Grimmelshausen, Hans Jakob Christoffel von (c. 1625-76), a Ger. author, b. at Gelnhausen in Hesse-Cassel. As a boy he was kidnapped by Hessian soldiers, and becoming a soldier himself fought on the Imperial side in the Thirty Years' War. At the end of the war he settled at Renchen in Baden, and entered the service of the Bishop of Strassburg, becoming 'Schultheiss' (magistrate) of Renchen in 1665. He devoted his leisure to literature and published several remarkable novels. In 1669 he published *Der abenteuerliche Simplicissimus*, one of the best novels of the seventeenth century. It is modelled on the picaresque romances of Spain and is largely autobiographical in its descriptions of the stirring scenes of the hero's childhood. Among his other works are: *Simplicianische Schriften*; *Die Erzbetrügerin und Landstörzerin Courasche* (c. 1669), *Der seltsame Springinsfeld* (1670), and *Dus wunderbarliche Vogelneest* (1672). His satires and gallant novels, modelled on *Cyrano de Bergerac*, such as *Dietwald und Amelinde* (1670), are very inferior to *Simplicissimus*. See *Simplicissimus* (ed. by A. von Keller, 1854; H. Kurz, 1863-64).

Grimm's Law, an important phonetic law which states the changes in the consonants of words in the course of their development from the Primitive Aryan language into Low and High Ger. The various

languages of the Indo-European family show that, as they developed from Primitive Aryan, each into its own special form, their consonants and vowels underwent change according to a certain law. Knowing this law, the philologist can take a word from Primitive Aryan and say beforehand in what form that word will be found in any one of the languages descended from it—in Sanskrit, Latin, Gk., Teutonic. The vowel or consonant of the word will have undergone a regular and known metamorphosis. He could predict, for example, that *bhrātṛ* in Sanskrit would be in Gk. *φάτρος*, in Latin *frater*, in Gothic *broþar*, in Ger. *Bruder*, and in Eng. *brother*. The Teutonic languages, which Grimm investigated, differ from Primitive Aryan much more in their consonants than in their vowels, and these consonants it is with which G. L. is concerned. The Primitive Teutonic system of consonants is best seen in Gothic, the most anct. of the Teutonic languages, in Early Low Ger., and in Early Scandinavian. The Primitive Aryan consonant system is seen, with little deviation, in Sanskrit, Gk., Latin, Lithuanian, Old Slavonic, and Old Celtic. The Teutonic languages underwent their characteristic changes at two more or less definitely marked epochs. The first, known as the *First Consonant Shifting*, took place in prehistoric times, the *Second Consonant Shifting* belongs to the fifth, sixth, and seventh centuries. In the latter, certain Primitive Teutonic consonants underwent a change as the words in which they occurred entered the High Ger. dialects. A word beginning with a *t* in Gothic, for instance, would change this *t* for a *z* (pronounced *ts*) in High Ger. Gothic, which underwent only the first consonant shifting, is the best representative of the Low Ger. and Scandinavian dialects; Old High Ger. the best representative of the other divisions of the Teutonic languages. The most important consonant changes by which Primitive Aryan developed into Teutonic are summed up in the formula known as G. L., from Jakob Ludwig Karl Grimm (1785-1863), who first worked out the law which had already been suspected by Rask. This law, which takes into account the 'permutation of consonants' of the first shifting, states that the Aryan *bh*, *dh*, *gh* (the 'voiced aspirates') ultimately became in Teutonic *b*, *d*, *g* ('voiced stops' or 'mediae'), that *b*, *d*, *g* became *p*, *t*, *k* ('unvoiced stops' or 'tenues') and that *p*, *t*, *k* became *f*, *p*, *h* ('unvoiced spirants'; the *h* is like *ch* in *loch*).

	Sanskrit.	Greek.	Latin.	Gothic	Old High German.	German.	English.
bh	Bhrâtr	φράτηρ	frater	bro'ar	bruoder	Bruder	brother
dh	rudhira	έρυθρός	ruber	rands	rôt	rot	red
gh	stighnôti	στεῖχω	—	steigan	stigan	Steigen	sty
b	—	—	tribus	haup	dorf	Dorf	thorp
d	dam	δαμάω	domare	tamjan	zamjam	zähmen	tame
g	jānu	γόνυ	genu	knlu	knlu	Knie	knee
p	pad	πούς	pes	fôtus	fuoz	Fuss	foot
t	tri	τρεῖς	tres	hreis	dri	drei	three
k	kampata	κάπη	capere	hafjan	heffan	heben	heave

Whitney believes that these changes, so arbitrary in appearance, have a physiological basis. They arise in the course of what Max Müller calls 'dialectic growth,' similar to that instanced in the word *vat*, in wine-vat, which is the Old Eng. form of the N. Eng. *fat*, a vessel, and in such a dialectical change as that of *he liveth* into *he lives*, where the aspirate dental *th* becomes *s*. See Morris, *Historical Outlines of English Accidence*.

Grimsby, or Great Grimsby, a seaport in Lincolnshire, on the S. bank of the Humber, 15 m. S.E. of Hull, is the largest fishing port in England. The name is of Danish origin, meaning 'Grim's town.' The story goes that Grim or Gryme was a poor merchant who rescued a baby that he found deserted by the wayside. He brought him up and later found that he was the son of a Danish king, by whom he was richly rewarded, and so founded the town of G. in memory of his foster-son. There are many fine old buildings, including a parish church and some interesting Rom. remains. In the Middle Ages it was an important commercial centre, but the harbour became silted up and trade declined. In 1849 improvements were made, and there are now eight docks, covering 350 acres. Other industries carried on are tanning, brewing, and ship-building. There are three large ice factories and a large import trade in timber is carried on. The Anglo-Fr. Steamship Company was established here in 1856 for direct trade between G. and France. Their fleet of steam vessels were purchased by the Great Central Railway Co. and formed the nucleus of the present fleet of the L. & N.E. Railway Co. There is an excellent service to the continent from this port. There is a free grammar school (1547), a school for technical instruction, a mechanics' institute, and a free public library. The town returns one member to parliament. Cleethorpes, 3½ m. S.E. of G., is a well-known health resort. The Immingham docks are 5 m. N. of G. Pop. 91,540.

Grimmel Pass, situated in the Bernese Alps, Switzerland. It is over

7000 ft. high, and leads to the valley of the Aar, being crossed by a carriage road. At the foot of the pass is the Grimsel Hospice. It was here that the Fr. were victorious over the Austrians in 1799.

Grimthorpe, Edmund Becket, Baron (1816-1905), a famous authority on architecture and horology, was the designer of Big Ben, the great Westminster clock. He was b. at Carlton Hall, near Newark, educated at Eton and Cambridge, was called to the Bar, and became a Q.C. in 1854. He was for some years a leader of the parliamentary Bar. He was much interested in architecture, designed several churches, and was responsible for restoring St. Albans Cathedral. He also occupied the presidency of the British Horological Institute, and published many useful works of scientific interest, as well as articles on ecclesiastical law.

Grindelwald, a vil. situated in the canton of Bern, Switzerland, and in the Bernese Oberland. Here are the Upper and Lower G. glaciers, and the beauty of the spot attracts a large number of visitors. It is connected by rail with Interlaken and Lauterbrunnen. Pop. about 3400.

Gringore (or Gringoire), Pierre (c. 1475-c. 1544), a Fr. poet and dramatist, b. at Caen. He began his literary career by writing allegorical and moral poems, afterwards writing for the stage, his works containing satires on the politics of the time. He was for many years a member of the 'Entants sans Souci,' a theatrical company of Paris, and in his comedies attacked all people, including the pope. The latter years of his life were spent in the service of the Duke of Lorraine, during which time he wrote religious poetry. His chief works are: *Le Jeu du Prince des Sots*, 1511, in which he satirised Pope Julius II.; *Le Mystère de Saint-Louis*, about 1524; *La Chasse du Cerf des Cerfs*, about 1520; *Heures de Notre Dame*, 1524. See Emile Badel, *Pierre Gringoire*, 1892.

Grinnell, a city of Iowa, U.S.A., in Poweshiek co., 55 m. N.E. of Des Moines. Manufs. include carriages, flour, gloves, etc. Pop. 4949.

Grinstead, East, a tn. in the co. of

Sussex, England, just over 30 m. to the S.E. of London, and about 14 m. N.E. of Horsham. Here are situated Sackville College, founded 1608, and the St. Margaret sisterhood. It has a fine old parish church. Pop. 7322.

Griqualand East, a district of Cape Colony, S. Africa, and lies to the S. of Natal. It has an area of over 7500 sq. m. Adam Kok, the Griqua chief, originally settled here, bringing with him 15,000 Griquas. Since 1875 it has been under the rule of Cape Colony. The chief town is Kokstad. Pop. about 264,000 (1921). In 1926 the European pop. was 7065.

Griqualand West, situated to the N. of Cape Colony, is bounded E. and S. by the Orange R., and N. by Bechuanaland. In 1870 a party of prospectors discovered the rich ground, afterwards known as Natal Kopje, which marks the start of the diamond industry in S. Africa. Claims were laid to this valuable area by the Transvaal and Orange Free State Republics and the English gov., finally being settled in favour of the last. This territory was proclaimed in Oct. 1871 as the Crown Colony of Griqualand W., and a sum of £90,000 was paid to the Orange Free State by way of compensation. From this time people flocked to the colony and the pop. rose to 50,000 in the first year, though of a very 'floating' character. Diamond digging in this colony has always been one of the most profitable, yielding 10 per cent. of the S. African output. On Oct. 15, 1880, G. W. was incorporated with the Cape Colony, which was merged in the Union of S. Africa, May 31, 1910.

Griselda, a fictional character whose conduct typifies wifely obedience. She was a very beautiful Piedmontese peasant girl wooed by the Marquis of Saluzzo. She became his wife, and to assure himself of the worth and stability of her character he put her to the severest ordeals, through all of which she passed successfully. After which, confidence completely restored, they were reconciled and happy. The origin of the story was Boccaccio's *Decameron*. Petrarch also used it, and Chaucer in his *Clerke's Tale*. On all parts of the Continent versions of it are found, and it has formed the subject of several plays: Fr., Ger., and Early Eng.

Grisi, Giulia, or Julia (1811-69), a famous soprano *prima-donna*, b. at Milan. She studied at Bologna under Giacomo Giacomelli, and made her first public appearance there in the part of Emma, in Rossini's *Zelmira*. She visited Florence, Paris, and London, winning universal fame. Several

operas were written especially for her, including Bellini's *Puritani*; but the rôle in which she obtained her greatest triumphs was that of Norma. In 1856 she married Mario, a tenor, and toured with him in America. The tour was not a success and she returned to Europe. She d. at Berlin.

Gris-nez (Fr. 'grey ness'), a cape in the dept. of Pas de Calais, France, is the point on the Fr. coast nearest to Britain. It is midway between Calais and Boulogne, and opposite Dover. Its lighthouse has a revolving light.

Grisons, the largest canton of Switzerland, is bounded on the E. and S. by the Tyrol and Lombardy. It is a wild mountainous district intersected by narrow valleys. It includes the upper valley of the Inn, the three main sources of the Rhine and several glacier groups. The valleys are fertile and cattle rearing and agriculture are the chief pursuits of the inhabitants. Iron, lead, and copper are found in small quantities and there are mineral springs. The name (from Graubünden, the Grey League) is derived from the grey coat worn by the people of the canton who formed a league in the fifteenth century to resist the tyranny of the nobles. The capital is Chur, and Davos, St. Moritz, and Arosa are popular pleasure resorts. Pop. 121,540.

Grits, coarse sandstones, often very impure. Examples occur in the greywackes and the Torridonian sandstones of Scotland and Wales. Millstone G. is the fourth member of the Upper Carboniferous series and is situated between the Lower Coal Measures and the Pendleside group. It varies from 4000 ft. thick in Lancashire until it becomes very unimportant in Scotland. In S. Wales it consists of several layers, the top of massive sandstones termed 'Farewell Rock' by the miners, because no workable seams of coal lie below it. Pennant G. of the same district is a hard grey felspathic sandstone, cut as a freestone and used for building purposes. Kinderscout G., so named from the Peak of Derbyshire, is the lowest division of the Millstone G. of that area, while Rosslyn sandstone of Scotland is still another local development.

Groat (from the Dutch, 'great' or 'thick'), the name applied in the Middle Ages to all large thick coins. The Eng. G. was first issued in 1351, and discontinued in 1662. It was a silver coin equal in value to fourpence. In 1836 a coin of similar value was struck, the fourpenny piece.

Grock (Adrien Wettach), famous modern clown, whose real name is

Adrien Wettach. Son of a Swiss watchmaker. He early sought work in a circus, doing everything and anything, being by turns first fiddle, pianist, cashier, mime and acrobat—but always the philosopher with a yearning for music. Later he left the 'wandering fellowship,' where he had earned popularity under the style of Brick and Grock, for the music-halls, and refined his tricks to that exquisite point where the acrobatics of clownship were harmonised with the art of the theatre. G. made the change with entire mastery, and London audiences will long remember his diminutive fiddle, his quaint antics with a grand piano, his thin dwindling shanks and generally unique drollery. He is said to have amassed a considerable fortune by his performances (see Willson Disher, *Clowns and Pantomimes*, 1930).

Grodok, a tn. in Galicia, Poland, 16 m. W.S.W. of Lemberg, is a great flax-growing centre. Pop. about 13,000.

Grodno : (1) or **Gardinas**, a portion of which is a province of Lithuania; the other or N. part being claimed by Poland. It is bounded N. by Vilna, S. by Volhynia, E. by Minsk, W. by Poland, and covers an area of 14,900 sq. m. It is low and marshy, and there are extensive pine forests. The principal rivers are the Niemen, Bug, and Narev. Rye, flax, hemp, barley and potatoes are grown; the chief industries are cloth, leather, bricks, and tobacco manufactures. Pop. 2,094,300. (2) A tn., cap. of above, on the Niemen, 80 m. S.S.W. of Vilna. It contains two castles, one dating from the twelfth century; the other, quite modern, is now turned into a military hospital. Here the second partition of Poland was arranged, 1793, and in 1795 it was taken over by Russia. Chief manufs. pottery, tobacco, soap, tallow, and machinery. Pop. 64,100.

Groin, an architectural term signifying the angular curve made by the intersection of two arches; when the intersecting arches have the same diameter and height, the G. is said to be regular; when one is semi-elliptical and the other semicircular, the G. is irregular. In Gothic architecture the Gs. are always ribbed.

Grolier, Jean, Viscount d'Aguisy (1479-1565), a Fr. bibliophile and connoisseur of book bindings, was b. at Lyons. He entered the diplomatic service under Francis I. and spent some time in Milan and Rome. There he gradually collected a unique library of richly-bound volumes, devoting a great part of his fortune to it. In 1675 the collection was sold publicly, realising very high prices.

Part of it is in the National Library, Paris, and a few volumes are in the British Museum.

Grolier Club, was founded in New York in 1884 with the object of encouraging the art of bookmaking. Lectures and exhibitions are given, and a number of works have been published by it. It has a library and reading-room.

Groningen : (1) The most N. prov. of the Netherlands, is bounded N. by the N. Sea, S. by the Drente, E. by Hanover, and W. by Friesland. It is very low, and includes much reclaimed marshland. The soil is fertile and well cultivated, and agriculture is the principal industry of the people. On the coast, fishing and shipbuilding are carried on. Pop. about 386,000. (2) The cap. of the prov. of G., on the Hunse, 92 m. N.E. of Amsterdam, is the most important town in the N. of Holland. Connected by canals with the Dollart and Zuyder Zee, it forms a good centre for trade. It possesses a university, botanical gardens, a museum and town hall, and is well laid out. The chief industries are linen and woollen manufs., tobacco, and boat building. Pop. about 98,000.

Gronovius, the name of a family of scholars who settled in Holland. They were of Ger. extraction—their name being Gronov—of which the above is a Latinised form. The principal members of this family were :

Johann Friedrich Gronovius (1611-71), b. at Hamburg. He was at first a professor at Deventer (1642), and afterwards at Leyden (1658). His knowledge of the classics and of antiquities was profound. He edited Livy, Tacitus, Plautus, Cicero, and the works of many other writers.

Jacobus Gronovius (1645-1716), son of the preceding, was b. at Deventer. He also was a great scholar, and was first a professor at Pisa and then at Leyden from 1679 till his death. His chief work was *Thesaurus Antiquitatum Græcorum*, 1697-1702, although he edited several of the classics.

Abraham Gronovius (1694-1775), son of the preceding, was librarian of Leyden University.

Johann Friedrich Gronovius (1690-1760), brother of the preceding, was a botanist, and writer of *Flora Virginica*, 1739-43, and *Flora Orientalis*, 1755.

Lorenz Theodor Gronovius (1730-77), son of the preceding, was the author of *Museum Ichthyologicum*, 1754-56, and *Zoophylacium Gronovianum*, 1763-81.

Groome, Francis Hinds (1851-1902), an Eng. author, son of Archdeacon G. of Suffolk. By 1877 he

had embarked on a literary career, and is especially known as a student of gipsies, their life, language, and customs. He lived amongst them himself, winning their confidence and becoming steeped in their lore and history. G. wrote *In Gypsy Tents*, 1880; *Gypsy Folk-Tales*, 1899; and edited *Borrow's Lavengro*, 1900. He was one of the founders of the Gypsy Lore Society, and joint-editor of its *Journal* from 1888 to 1891. Other works are: *A Short Border History*, 1887; *Two Suffolk Friends* (Archdeacon G. and E. FitzGerald); the novel *Kriegspiel*, 1896; and the editing of the *Ordnance Gazetteer of Scotland* . . ., 1882-85. G. was one of the editors of Chambers's *Encyclopaedia*, 1885-92, and joint-editor of the *Biographical Dictionary*, 1897. See *Athenaeum*, Nos. 2763, 3012.

Groote Eylandt, an island lying off the N. coast of Australia in the Gulf of Carpentaria. It is about 40 m. long and 40 m. broad.

Gros, Antoine Jean, Baron (1771-1835), a Fr. painter, b. in Paris, was the son of a miniature painter. He studied first at David's studio, and afterwards travelled in Italy, where he became acquainted with Napoleon Bonaparte, having been introduced by Josephine. He was given an official position by Bonaparte and became a military painter. In 1824 he was made a baron by Charles X. for his paintings in the Pantheon. He afterwards gave up the romantic style of painting and turned to the classic style. In this, however, he seems to have been unsuccessful, and committed suicide by throwing himself into the Seine. His best pictures are: 'Bonaparte at the Bridge of Arcole'; 'Napoleon visiting the Plague-stricken at Jaffa'; 'The Battle of Eylau'; 'The Meeting of Charles V. and Francis I.'; and among his classic style, 'Hercules and Diomedes.'

Grosart, Alexander Balloch (1827-99), a Scottish ecclesiastic and writer, b. at Stirling. He was a student at Edinburgh University, and in 1856 was appointed Presbyterian minister at Kinross. In 1865 he became minister of Prince's Park, Liverpool, and of Blackburn in 1868, giving up the ministry in 1892. His chief work was done in his editing of Elizabethan literature. He published the Fuller's Worthies Library, consisting of thirty-nine volumes, 1868-76, and in the latter year began the Chertsey Worthies Library, both of which publications included the works of many authors, among them George Herbert, Sir Philip Sidney, and Abraham Cowley. In addition to these, he edited the works of

writers such as Edmund Spenser, Samuel Daniel, and a number of others.

Grosbeak, the name applied to some of the species of the family Fringillidae, belonging to the order Passeriformes, and including the various kinds of finches. In these birds the beak is stout and very



GROSBEAK
(Hawfinch)

much developed. Among the species may be mentioned the Pine G. (*Pyrrhula enucleator*), found in the regions of the N., and the Hawfinch (*Coccothraustes vulgaris*), occasionally found in Britain.

Grose, Francis (c. 1731-91), an Eng. antiquary, b. at Greenford in Middlesex. He was at first a draughtsman, and exhibited his architectural drawings at the Academy, and from 1755 to 1763 was Richmond herald. He spent a large part of his time in antiquarian research, and during this time became acquainted with Robert Burns. His chief works are: *Antiquities of England and Wales*, 1773-87; *Antiquities of Scotland*, 1789-91; *Classical Dictionary of the Vulgar Tongue*, 1785.

Grosnaya, Grosnyi, or Grozny, a tn. on an affluent of the R. Terek in the Republic of Daghestan R.S.F.S.R. It is situated in the region of the Caucasus and has refineries of petroleum. A pipe line connects G. with the Caspian Sea. The region is rich in gold, silver, lead, iron ore, etc. Pop. about 16,000.

Grossenhain, a tn. of Germany, situated in the republic of Saxony to the N.W. of Dresden, and on the R. Röder. It manufs. silk and

had embarked on a literary career, and is especially known as a student of gipsies, their life, language, and customs. He lived amongst them himself, winning their confidence and becoming steeped in their lore and history. G. wrote *In Gypsy Tents*, 1880; *Gypsy Folk-Tales*, 1899; and edited *Borrow's Lavengro*, 1900. He was one of the founders of the Gypsy Lore Society, and joint-editor of its *Journal* from 1888 to 1891. Other works are: *A Short Border History*, 1887; *Two Suffolk Friends* (Archdeacon G. and E. FitzGerald); the novel *Kriegspiel*, 1896; and the editing of the *Ordnance Gazetteer of Scotland* . . ., 1882-85. G. was one of the editors of Chambers's *Encyclopaedia*, 1885-92, and joint-editor of the *Biographical Dictionary*, 1897. See *Athenaeum*, Nos. 2763, 3012.

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Grossenhain, a tn. of Germany, situated in the republic of Saxony to the N.W. of Dresden, and on the R. Röder. It manufs. silk and

woollen goods, hosiery, and machinery. Pop. about 12,400.

Grosseteste, Robert (c. 1175–1253), a Bishop of Lincoln, b. at Stradbroke in Suffolk, and was of humble parentage. He was educated at Oxford, and seems also to have obtained some of his education in Paris. He became chancellor of Oxford University, and rector of the Franciscans in that town. After holding the offices of archdeacon of Northampton and then Leicester, he became, in 1235, Bishop of Lincoln. While holding this office he carried on a dispute from 1239 to 1245 with the Lincoln chapter, finally gaining his point—the right of visitation. He also stood up for the rights of the church against the state, thus involving himself in disputes with Henry III., and for his own church against that of Rome, thereby coming into conflict with the pope, as on the occasion of his refusing to appoint the pope's nephew in the Lincoln diocese. See Francis Seymour Stevenson, *Robert Grosseteste, Bishop of Lincoln*, 1899.

Grosseto: (1) An Italian prov. in Tuscany. It is a mining and agricultural district, but is very barren and unhealthy in parts. Area 1735 sq. m. Pop. 164,990. (2) A tn. of Italy, cap. of the above prov., about 40 m. S.S.W. of Siena. It is an old fortified town, and has a beautiful cathedral which dates from 1294. There are hot mineral springs in the neighbourhood. Near to it are the ruins of Rusellæ, an old Etruscan city. Pop. (commune) 19,085.

Grossglockner, see GLOCKNER, GROSS.

Grossgörschen, a vil. of Prussian Saxony, situated S. of Lützen. The battle of Lützen, in 1813, is often styled the battle of G.

Gross-Lichterfelde, a tn. and com. of Prussian Germany in the prov. of Brandenburg. It forms a suburb of Berlin, and is situated about 6 m. from the city. There is a cadet school. Pop. 42,510.

Grossmith, George (1847–1912), an Eng. actor and public entertainer, son of a journalist. In 1866 he was a reporter for the *Times*, but soon gave it up for the stage. In 1870 he made his début at the Polytechnic as an entertainer, with comic songs and sketches at the piano. In 1877 he began a successful career as actor in *The Sorcerer*, later playing in many other Gilbert and Sullivan operas, and winning especial distinction as the Admiral in *Pinafore*. He was with the D'Oyly Carte company at the Savoy from 1881 to 1889, and then resumed his individual recitals for a time. He played in *His Excellency*, 1894; *Young Mrs. Yarde*, 1898; and

The Gay Pretenders, 1900. Again resuming his recitals for some years, he finally retired in 1909. His writings include: *The Reminiscences of a Society Clown*, 1888; *The Diary of a Nobody* (with his brother, Weedon G.), 1894; *Cups and Saucers*, and various songs. George G., junior, and Lawrence are his sons.

Gross-Moyeuivre, a tn. of the dept. of Moselle (Lorraine), France, in the circle of Diedenhofen, on the R. Orne, 10½ m. from Metz. Iron-ore is mined, and there are smelting works. Pop. about 9000.

Grosswardein (now known as Oradea Mare), an old tn. of Rumania, cap. of Bihar, on the Rapid Korös, about 150 m. S.E. of Budapest. It contains an old fortress and many public buildings, among them two bishops' palaces, as it is the seat of both Rom. Catholic and Gk. Catholic bishops. Ceded by Hungary after the World War. Pop. about 60,000.

Grote, George (1794–1871), an eminent Eng. historian and politician, author of a standard work on Greece. He was educated at Charterhouse School, and after spending thirty years of his life as a banker and ten as one of the members of parliament for London, he retired from parliament in 1831 and from business in 1843 to give his whole time to literature. He was, with Bentham and Mill, one of the group of 'Philosophical Radicals' whose principles he actively supported in parliament; he was one of the chief advocates of the ballot. G. criticised Mitford's *History of Greece*, attacking its anti-democratic deductions, which he held to be based on misconception. His own *magnum opus* regards the gov. of Athens as that of an idealised democracy. G.'s *History of Greece*, characterised by deep learning and the method of the 'philosophical' historian, superseded Mitford's and even the more scholarly work of Thirlwall. He wrote also *Plato and other Companions of Socrates*, and an unfinished work on Aristotle. See Life by Mrs. Grote.

Grotefend, Georg Friedrich (1775–1853), a Ger. orientalist and classical philologist, educated at Göttingen. He held posts at the Frankfurt gymnasium, 1797–1821, leaving to become director of the lyceum at Hanover, and retiring from public life, 1849. G. is most famous for contributing to the decipherment of old Persian (cuneiform) inscriptions, and is sometimes considered as the first to find the key, increasing the number of known characters from three to eleven. He first began this study in 1802, and directed his attention to the interpretation of the Lycian inscriptions.

His *Neue Beiträge zur Erläuterung der Persepolitischen Keilschrift* appeared in 1837; . . . *zur Erläuterung der Babylonischen Keilschrift*, 1840. Other works are: *Anfangsgründe der deutschen Poesie*, 1815; *Rudimenta Lingue Umbricae*, 1835-38; *Rudimenta Lingue Oscae*, 1839; *Geographie und Geschichte von Aëtialica*, 1840-42. He also revised Wenck's *Lateinische Grammatik*, 1823-24, and contributed to the *Encyclopædia* of Ersch and Gruber. See works of Sayce on *Ancient Monuments*, 1881-94.

Grotesque (It. *grottesco*, from *grottesca*, style of painting found in ancient crypts, *crypta*, or *grotta*), in art, a capricious and incongruous style of decoration, in which human figures, animals, flowers, and fruit are all fantastically mingled in wild confusion. This style was used in the thirteenth century, and rediscovered during excavations made in the baths of Titus. It was very popular in the Renaissance period, but soon became debased. G. has come to be applied to any fanciful combination of ideas, or to any extravagant and absurd representation or appearance. See Florio's *Dictionary*, 1598 and 1611; also ARABESQUE, CARICATURE.

Groth, Klaus (1819-99), a Ger. poet, b. at Heide in Schleswig-Holstein, and educated at Tondern. He then became a teacher in his own native village, but afterwards went to Kiel in order to continue further his studies. His health, however, broke down, and for some time he was not able to go on. He finally took a degree as doctor of philosophy at Bonn, and settled in the town of Kiel. He wrote lyric and epic poetry, and although his poems do not reflect the expression of Ger. country-life as well as the author, F. Reuter, on whom he modelled himself, nevertheless he has gained for himself a place amongst the Ger. poets. His chief works are: *Quickborn*; *Drei Plattdeutsche Erzählungen*; *Vertelln*; *Volkleben im plattdeutschen Gedichten*.

Grotius, Hugo, otherwise known as Huig van Groot (1583-1645), a celebrated Dutch jurist, b. at Delft, and educated at Leyden. Leaving here, he entered the diplomatic service and was for a short time in service with an embassy to England. He became pensionary of Rotterdam and supported the Arminians in their religious controversies. This gained for him the hatred of Prince Maurice, and he was arrested and condemned to imprisonment for life. By the aid of his wife he escaped, and took refuge in Paris. Here he was granted a pension by Louis XIII. (1621). He distinguished himself in every branch of literature and diplomacy. In 1625

he issued his celebrated work on international law, *De Jure Belli et Pacis*. He became the ambassador of Sweden at the Fr. courts, and later proceeded to Stockholm. Returning from here he died at Rostock.



HUGO GROTIUS

He wrote much on theology, history, and law, whilst as a poet he published some respectable verse both in Latin and Dutch. Works: *Annales de Rebus Belgicis*, and *De Veritate Religionis Christianæ*. Life by Butler, 1827.

Groton, a tn. in the U.S.A., co. of New London, Connecticut, on the R. Thames. Its chief industries are connected with engineering and tobacco. In 1781 the town played an important part in the American War of Independence, but the garrison was massacred. Pop. 4122.

Grotta del Cane ('Grotto of the Dog'), a cave near Naples and bordering on Lake Agnano. The cave is filled with carbonic acid gas fumes of great strength. The name was given because little dogs when sent into the cave were almost suffocated, but revived on being taken out.

Grotte, a Sicilian tn., 13 m. N.E. of the tn. of Girgenti. It is the centre of the sulphur mining industry. Pop. about 11,000.

Grouchy, Emmanuel, Marquis de (1766-1847), a Fr. general who was b. in Paris. He first saw active service with the revolutionary armies in La Vendée. He was second in command of the army which was sent to invade Ireland, and was able to land in Ireland, although he accomplished

little. He next proceeded to Italy, where he helped Joubert. He showed great courage and ability during the battles of Eylau, Friedland, and Wagram, and was in command of the bodyguard of Napoleon during the Russian campaign. He fought at Leipzig, and covered the retreat of Napoleon to Paris. He was amongst the first to welcome Napoleon on his return to France. He fought and defeated Blücher at Ligny, but misjudged that general's tenacity of purpose. After attempting to hold together the Fr. armies after Napoleon's second abdication, he fled to the U.S.A. He returned in 1819, and was restored to his rank in the Fr. army in 1831. His *Memoirs* (5 vols.) were published by his grandson.

Ground Annual, in Scottish law, an interest in land in the nature of an annual rent or perpetual annuity. It is of two kinds: (a) Feu duties arising out of church property parcelled out in lordships erected by the crown, such feu duties being the interest retained by the Lords of Erection after resigning their superiorities to the crown. The feu duties became perpetually payable because the crown never rendered any consideration (*q.v.*) for the power to redeem them. (b) Rents reserved for building lots in burghs where sub-feus are prohibited. Such G. A. is in the nature of a real burden laid on the lands of a fixed annual payment in lieu of price, and is usually accompanied with a personal obligation on the part of the building speculator that he and his representatives in a sale will not get rid of the G. A.

Ground-base, in music, a bass, consisting of a few notes or bars, unceasingly repeated, and each time accompanied by a new or varied melody. See Beethoven's *Sonate Pathétique*, Op. 13, first movement, *molto allegro*.

Ground-ice, see ANCHOR-ICE.

Groundling (*Cobitis taenia*), a fish of the loach variety. It is rarely



GROUNDLING

found nowadays, but occurs in English waters occasionally. It is very small.

Ground-nut, a term often applied to the edible parts of the roots of various plants. Amongst the best known may be mentioned the earth nut (*Bunium esculentum*) and the roots of the *Apios tuberosa*.

Ground Pigeon, a pigeon of the *Peristerinae* family. They have

longer legs than the usual type of pigeon. Turtle-doves belong to this family.

Ground Rent, the rent reserved by a landowner to himself in consideration of allowing buildings to be erected on his land. The customary arrangement in speculative building operations is for the landowner not to grant a lease at all until the buildings or part of the buildings are completed, but to enter into an agreement with the builder to reserve a total G. R. on his land to be subsequently apportioned to the houses as and when they are completed. As each house or integral building is completed the landowner grants a lease in which he reserves the G. R. on the site covered by such house or building. The interest of the builder in the land therefore ends with the sale of the houses built, unless, as often happens, he buys the G. R. himself. As the builder thus drops out of the transaction, the liability on the covenants becomes severable, each purchaser being liable only for breaches in respect of his own lease and house.

Groups, Theory of, the study in higher mathematics which deals, not with actual quantities, but with operations. Certain operations in elementary work are familiar, *e.g.* multiplication, the squaring of a number, the rotating of a figure about an axis, and differentiation. If A is any operator which operates on any quantity F , the result is usually expressed AF . If A operates again on the result, this becomes AAF or A^2F ; if again, A^3F , and so on. When the result of two successive operations in any order leaves the subject of the operations unchanged, the operators are then said to be *inverse*. The successive application of an operator and its inverse is known as the *identical* operation. Thus if X and Y are two such inverse operators, $XYF = F$ and $YXF = F$; $\therefore XY = 1$ and $YX = 1$, and hence it is found convenient to write X^{-1} for Y . Thus $XX^{-1} = 1$ and $X^{-1}X = 1$. Thus the result of the inverse operation of X on F is $X^{-1}F$, and the result of a second operation is $X^{-2}F$, and so on. Let A, B, C be three operations capable of operating on the same set of objects, of which the result of any two in any order equals the third, *e.g.* $AB = C$, then A, B, C and their inverses are said to form a group. And generally any number of such operations of which the result of the successive application of any two is equivalent to a third form with their inverses a group. The number of operations in a group may be finite or infinite. When it is finite the number is called the order of the group. For

example, A², A, 1, A⁻¹, A⁻² form a group, which in this case is said to be cyclical.

Grouse and Grouse-shooting. G. is a name which is in the exact sense applicable to all the members of the sub-family Tetraoninae; as commonly used the word refers only to the Red G. In addition to this species the Black G. (*Tetrao tetrix*) and the Wood G. (*T. urogallus*) are found in Great Britain; these are better known by the names respectively of Blackcock and Capercailzie, and reference should be made to articles under those headings. Among the other species of G. may be named the Pinnated G. (*T. cupido*), peculiar to America; the Dusky G. (*T. obscurus*), which inhabits the Rocky Mountains; the Canadian G. (*T. Canadensis*), found in Canada and the U.S.A.; the Hazel G. (*Bonasa sylvestris*) of N. Europe; the Ruffed G. (*B. umbellus*) of N. America; the Sand G. (*Pterocle*) and the Prairie Hen (*Syrhaptes*), which are found in the Asiatic tablelands, constitute another family (the Pteroclidæ). For the White G. (*Lagopus mutus*, or *vulgatus*) see under PTARMIGAN. The Red G. (*L. Scoticus*), also called the Moorcock or Moor-fowl, is considered to be a variety of the willow G. (*L. albus*), which is found in Northern Europe, Asia, and America. It is found in the N. of England, particularly in Yorkshire, Lancashire, Derbyshire, and Durham; in Wales, Ireland, and the Scottish islands, and in most abundance in the Highlands of Scotland. The species is peculiar to the above-mentioned localities, and differs from the other members of the same genus in the fact that it does not turn white in the winter. G. shooting, as generally used, refers exclusively to the Red G., and under that heading the habits, etc., of the bird will be treated.

Grouse-shooting.—The Red G. is monogamous; the pairing takes place early in the spring. The female lays from five to fifteen eggs, which require twenty-four days to hatch. The young birds are strong and hardy after the first fortnight, which is a somewhat critical period. The principal enemy of the birds is the G. disease (*Strongylus pergracilis*), an epidemic disease which occasionally causes great ravages among the birds, and in a very bad season will practically preclude shooting over the moors affected. All through the summer the young birds follow the parent birds; in the autumn they 'break up' until the winter, when they come together again in flocks (known as 'packs'), numbering, on the average, about thirty or forty,

though sometimes as many as sixty are found. In order that a G. moor should furnish an abundance of birds, the latter must have a good supply of food and drink. The first requisite for a moor is therefore an abundant supply of pure water, and as the young shoots of the heather and wild ling form the chief food of the birds at certain seasons, the heather must be made to produce such shoots. This is effected by skilful periodical burning of the heather in tracts, as old heather will not provide the required shoots. There are two



BLACK GROUSE

methods of shooting G., over dogs, or by driving. The former method, usually only practised on small moors, is impossible after the birds have begun to pack. The most important thing in G. shooting over dogs is the direction of the wind. When a G. is disturbed, it will fly down the wind, and if the sportsman is also coming down the wind, his chance of a good shot will be small. If the G. is made to breast the wind as it rises, it will turn and fly down the wind as soon as it has a sufficient velocity, and as it turns there will be the best chance of a shot. A moderate breeze blowing across the line taken by the shooting party is the best, and the most favourable weather is clear and sunny. If the weather is wild and wet, the best of dogs and shots do not stand much chance of a heavy bag. The dogs used are pointers or setters, the former being better if there is a plentiful supply of birds, otherwise the latter. The G. are 'driven' towards hidden 'butts,' or 'batteries,' in which are the 'guns'; and which are situated about 80 yards apart. It is obvious that upon the site of the 'butts' depends much of the success

of the shooting. The beaters are spread out in the form of a crescent; and are provided with flags to show the line of flight. The flanks must be well protected, the usual line of flight of the birds, and the peculiarities of the district must all be taken into account. The birds are shot as they fly towards the butts; their flight is so very rapid that it requires a first-class shot to kill with both barrels. From Dec. 11 to Aug. 11 (inclusive) is the 'close time' for G.; 'the Twelfth,' is the abbreviation by which the opening of the season is generally known. For G. diseases see the papers of Prof. Young in the *Proceedings of the Natural History Society of Glasgow* (T.P. 225), and Dr. Klain's work on the subject. See *Grouse Shooting*, 1893; T. Cank, *Forty Years Mingled in Game, Fur, and Feather*, 1891; C. Dixon, *The Game Birds and Wild Fowl of the British Isles*, 1893.

Grove, Sir George (1820-1900), an Eng. writer who is principally remembered for his contributions to the literature of music. He was at first an engineer, and spent his early days in works of engineering in the West Indies. In 1849 he became secretary to the Society of Arts and later to the Crystal Palace. Here he was largely responsible for the institution of those concerts which have had so much to do to promote the education of the British public in music. In 1868 he became editor of *Macmillan's Magazine*, and between the years 1878 and 1889 he edited the *Dictionary of Music*. He was the first director of the Royal College of Music, and was knighted on his appointment. See *Life by Charles L. Graves*.

Grove, Sir William Robert (1811-96), a scientist and lawyer, b. at Swansea, he was educated by private tutors and at Brasenose College. He was called to the Bar in 1835, and then for a time devoted himself to scientific studies. He invented a voltaic cell that is called the Grove Cell, and by this and by an anticipation of the methods of electric lighting, he made a great name for himself in the realm of science. He published in 1846 a book called the *Correlation of Physical Forces*. In 1866 he was president of the British Association. His legal work had not been neglected, and in 1853 he became a Q.C., and was later made a judge of the Court of Common Pleas.

Grove's Cell, see CELL, VOLTAIC.

Growler, a fish found chiefly in the fresh waters of N. America. It usually measures 2 ft. or more, and is allied to the perch family (*Percidae*). This fish is edible.

Growth always denotes increase. Applied to mental processes it means

increase in ability to think and to reason, and in knowledge. Applied to nations or ideas, G. denotes progress or development. The term may also be used to signify the result of the process of G., for example, in describing cancer as a malignant G.

Generally, G. is increase in material, but this increase is acquired in very different ways by living and inanimate things. The G. of inanimate substances, such as crystals, proceeds by the addition of similar chemical material to the exterior, whereas living organisms grow by taking food within them, using it for the synthesis of various compounds, or breaking it down for the liberation of energy.

Organic G. has been defined in various ways—as increase in volume, as a change of form, and as increase in bulk—but it is now generally accepted as an increase in the material constituting an organism. This increment may be accompanied by change in volume, but the two are not necessarily concomitant.

The increase in material of an organism is equal to the difference between the amount of food synthesised and that broken down, that is, to the difference between anabolism and katabolism. If the result be positive, what is generally understood by G. has taken place; if the result be negative, a decrease in material or reduction will be indicated, and some of the lower animals, such as Planarians, can be induced by starvation to diminish to about one-tenth of their normal size. When they are fed, positive G. again takes place.

Several scientists regard growth as an autocatalytic reaction, in which the rate of change is increased by one or more of the products of the reaction acting as catalysts. Other investigators consider that although certain reactions concerned with G. are autocatalytic, other complex factors also enter into the process, and consequently the autocatalytic theory is only partial and not applicable to G. as a whole.

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Groyne, The, see CORUNA, LA.

Grub, the term applied to the larvæ of coleopterous insects. It is also erroneously given to the maggots, or larvæ of Diptera, which differ from the true Gs. in having no distinct head; and to the caterpillars, or larvæ of Lepidoptera, which differ in

having rudimentary legs; the G. of a bee or beetle generally has a distinct head but no legs. The so-called sheep-grub is the larvæ of the gad-fly, which sometimes deposits its eggs in the nostrils of animals.

Grub, George (1812-92), *b.* in Old Aberdeen and educated at the university there, where he ultimately became first a lecturer at Marischal, and afterwards professor of civil law at the university. He was greatly interested in Scottish ecclesiastical history, and edited several Scottish historical works. His great work was *The Ecclesiastical History of Scotland*, 1861, which was written from the Anglican point of view. For his *Life* see Walker, *Three Churchmen*, 1893.

Grubenhagen, an old principality of Germany. It was in the prov. of Hildesheim and formed part of the kingdom of Hanover, being divided into two districts—the Eastern and Western—having the Harz Mts. as a dividing line. The chief town was Einbeck, situated on the Ilm. Pop. about 80,000.

Gruber, Johann Gottfried (1774-1851), a Ger. author and historian, was *b.* at Naumberg. He was educated in his native town and at the University of Leipzig, after which he visited many of the other universities of Germany. At Weimar he enjoyed for a time the friendship of Goethe. He became a professor at the University of Wittenberg, and was largely instrumental in bringing about the union of that university with Halle. With Prof. Ersch he edited the *Allgemeine Encyclopädie der Wissenschaften und Künste*, a work which he continued after Ersch's death. He was also responsible for the editing of the *Allgemeine Literaturzeitung*. The whole of his works were very numerous.

Grub Street, now called Milton Street in honour of the poet whose home was near it, was famous in the seventeenth century for the reason given in Dr. Johnson's interesting definition in his *Dictionary*: 'Originally the name of a street near Moorfields in London, much inhabited by writers of small histories, dictionaries, and temporary poems, whence any mean production is called *Grub Street*.' The name has also been applied, since this time, as a collective term to struggling hack writers.

Grün, Anastasius, see AUERSBERG, ANTON ALEXANDER, COUNT OF.

Grunberg, a tn. of Prussia in the prov. of Silesia, 33 m. from Glogau. It has manufactures of woollens, machinery, straw hats, leather, and tobacco, and the vine is cultivated to a large extent, and wine and champagne exported. Pop. about 25,000.

Grundtvig, Nicolai Frederick Severin (1783-1872), a Danish antiquarian, poet, preacher, and reformer, *b.* at Udby, Zealand, and educated at Copenhagen. He was pastor of Presto from 1821-2, when he became chaplain of the Church of the Saviour, Copenhagen. In 1825 he made a vehement protest in his *Kirkens Gjenmæle* against 'rationalism' in the church. This raised a storm of bitter controversy, and G. was deprived of ecclesiastical office. He championed the cause of civil and religious freedom, advocated the separation of church and state, and helped to bring about many reforms. As a member of the *Folkething* he collaborated in the drawing up of the Liberal constitution of 1849. He was reinstated and made a bishop in 1861. G. studied and wrote upon the ancient Norse traditions and translated the *Saxo Grammaticus*, *Snorri Sturluson*, and the *Beowulf*. In connection with his antiquarian studies he was charged with three missions to England to collect the remains of the ancient Anglo-Saxon literature. He published a volume of the anct. popular songs of Iceland, *Popular Danish Songs*, collected among the Danish peasantry who sang them to him, *Kort Begreb af Verdens Krønike i Sammenhæng*, several volumes of poems, and a system of philosophy, *Mind and Liberty*.

Grundtvig, Svend Hersleb (1824-83), son of the preceding, a Danish philologist. His father educated him, teaching him especially Gk., Danish, Old Norse, and English, and transmitting to him his own great enthusiasm for the Danish ballads and literature. His greatest work is *Danmarks gamle Folkeviser* (5 vols.), in which are reproduced the ancient texts of popular songs together with their subsequent forms collected orally.

Grundy, Mrs., the name given to an imaginary character, who may well be described as the presiding deity of English respectability. She appears first in English literature in a play called *Speed the Plough*, where she is continually referred to as an authority on the proprieties. Her name has become a household word, but is used now with a contemptuous connotation.

Grundy, Sydney (1848-1914), a dramatic author, *b.* at Manchester. He was educated at Owens College, Manchester, and after leaving, studied law and practised as a barrister in his native town from 1869 to 1876. His first play, *A Little Change*, was produced at the Haymarket Theatre in 1872, and in 1887 he made a great success with *The Belle of Haslemere*, written with H. Pettitt. He had,

however, previous to this production, become well known as an adapter of plays, having brought out *The Snow-ball*, taken from *Oscar, ou le mari qui trompe sa femme*, by Scribe and Duvergue, in 1879, and *In Honour Bound*, from Scribe's *Une Chaîne*, in 1880. The years 1889 and 1890 saw the production of the comedies, *A White Lie* and *A Fool's Paradise*, and these were followed by *Sowing the Wind*, 1893; *An Old Jew*, 1894; and *A Bunch of Violets*, 1894, taken from Feuillet's *Montjoye*. But the most successful of his adaptations was *A Pair of Spectacles*, 1890, taken from *Les Petits Oiseaux* of Labiche and Delacour. Others were: *A Marriage of Convenience*, 1897; *The Silver Key*, 1897; and *The Musqueteers*, 1899, all of which were taken from the works of Dumas; *Frocks and Frills*, 1902; *The Garden of Lies*, 1904; *Business is Business*, 1905; and *The Diplomats*, 1905. He also produced *The New Woman* and *The Slaves of the Ring* in 1894; *The Greatest of These* in 1895, played by Mr. and Mrs. Kendal; and *A Fearful Joy*, 1908.

Gruner, Wilhelm Heinrich Ludwig (1801-82), a Ger. engraver, b. at Dresden. He became the director of the Royal Museum at Dresden, and made a great name for himself as an engraver of many fine Italian masterpieces. In 1850 he published *Specimens of Ornamental Art* and *The Terra-cotta Architecture of North Italy*, 1867.

Grus, see CRANE.

Grus ('the Crane'), a southern constellation near Aquarius and Piscis Australis, introduced by sixteenth-century mariners. Near by are the constellations of Indus and Phoenix, on either side.

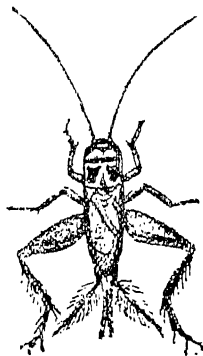
Grütli, or Rutli, a meadowland of Switzerland, situated in the canton of Uri, near Lake Lucerne. The Swiss League was founded here against Austria by the peasant leaders, Stauffacher, Arnold, Melchtal, and Walter Fürst. The meadow is now the property of the state, having been purchased by the school children of Switzerland. See Schiller, *Wilhelm Tell*, ii. 2.

Gruyère, a dist. and tn. of Switzerland in the canton of Freiburg, and 16 m. S.W. of that town. It is noted for its cheese. The cap. of the dist. is Bulle. Pop. (tn.) about 1700.

Gryllidæ, the name of a family of Orthoptera, belonging to the section Saltatoria, and typified by *Gryllus*, the cricket genus. All members of this family are characterised by a cylindrical body, long, slender antennæ, and, in the females, a long curved ovipositor. There are several genera,

which are widely distributed, *G. domesticus*, the common house-cricket, being found in the Old World and in N. America. The name grasshopper is often applied to *G. campestris* and *Nemobius sylvestris*, two species of field-cricket.

Gryllus, the genus to which the crickets belong. This order is distri-



GRYLLUS DOMESTICUS
(a male Cricket)

buted all over the world, but there are only four British varieties.

Gryphius, Sebastian (1493-1556), a printer, b. at Rentlingen in Swabia. He settled at Lyons in 1528, and from that date onwards printed about 300 books, including Hebrew, Greek, Latin, Italian and French. He was especially distinguished for the beauty of his Greek and Hebrew types, and his French and Latin books are still highly esteemed. Among the most noted of his works are the fine Latin Bible of 1550, and Dolet's *Commentaria Linguae Latine*.



GUACHARO

Guacharo, or Oil-bird (*Steatornis caripensis*), first found at Caripe in

Venezuela. It constitutes the family Steatornithidae, but is allied to the Nightjars. It is about the size of a crow, and lives chiefly in caverns near the sea.

Guadagnini, the name of a family of violin makers in Italy. Lorenzo, who, between 1695 and 1724, resided at Milan among other places, was a pupil of Stradivarius. His son, Giovanni Battista (1711-86), resided at Milan and Turin, both of them making instruments which are among the best of their kind.

Guadalajara: (1) Prov. of New Castile, Spain, bounded N. by Segovia, Soria, and Saragossa, E. by Teruel, S. by Cuenca, W. by Madrid. It is watered by tributaries of the Tagus, and yields agricultural produce. Silver is found in the dist., and pottery is manufactured. Area 4676 sq. m. Pop. 205,000. (2) Cap. of above on the Henares, 33 m. N.E. of Madrid. Among its chief noted buildings are the palace of the Mendozas and the Pantheon containing their tombs, the cloister of San Francisco, and a military engineering academy. There are textile and flour mills, and some serge and flannel are manufactured. Pop. about 13,500. (3) Cap. of Jalisco State, Mexico, founded about 1530, second largest city of the republic. It is the seat of an archbishop. The seventeenth-century cathedral contains an 'Assumption' by Murillo. There are also a university, art academy, and mint. Its manufs. of cottons, woollens, pottery, metal wares, glass, and confectionery are noted. The city is large and handsome with well-laid-out squares and streets, and is lit by electricity. It is connected by rail with Mexico. Many of its fine buildings were considerably damaged by the earthquake in 1818. Pop. 144,000.

Guadalaviar, a river of Eastern Spain, which rises in a small lake in the Sierra of Albaracin. Its course, amidst beautiful scenery, is generally S. and S.E. for 180 m. until it reaches the Mediterranean Sea at Valencia.

Guadalcázar, a tn. of Mexico in the state of San Luis Potosí, and 40 m. N.E. of that place. There are noted mines of quicksilver in the vicinity. Pop. 12,500.

Guadalquivir (ancient *Bætis*), a river of Spain. It rises in the Sierra del Pozo Morena, and at first flows N.E. and then alters its course, assuming a south-westerly direction through Andalusia, entering the Atlantic about 20 m. N. of Cadiz. It is navigable as far as Seville, below which town it divides, forming the islands of Isla Mayor and Isla Menor. It is about 350 m. long.

Guadalupe: (1) A river of Texas, rising in Kerr co., and flowing into the bay of San Antonio. It is about 250 m. long. (2) A com. of Mexico, in the state of Zacatecas, and situated 10 m. S.E. of the town of Zacatecas, with which it is connected by rail. Pop. about 8300.

Guadalupe Hidalgo, a tn. of Mexico, situated between 2 and 3 m. N. of Mexico. It is the site of a church which is much visited by pilgrims, and it was in this town that the treaty was made between the United States and Mexico in 1848, giving New Mexico and Upper California to the United States. Pop. c. 5500.

Guadarrama, Sierra de, a range of mountains in Spain, separating Madrid and Segovia, and situated between the Douro and the Tagus. The highest points in the range rise to about 8700 ft. Among them may be mentioned Sierra de Ayllon and the Pico de Penalara.

Guadeloupe, an island of the W. Indies and a French possession. It is really formed of two islands, Basse-Terre and Grande-Terre, separated by the Rivière Salée. Basse-Terre is of volcanic formation, the largest volcano being Soufrière, while Grande-Terre is comparatively flat. The climate is hot and the soil fertile, producing sugar, coffee, bananas, and rice, while Basse-Terre is covered with large forests. The dependencies of G. are: Marie Galante, St. Barthélemy, Désirade, Les Saintes, and part of St. Martin. The island is ruled by a governor and is represented in the French parliament. The capital is Basse-Terre. The principal industry is the manufacture of sugar and rum, but there are small factories for coffee, vanilla, etc., tanning and pottery works and also limekilns and foundries. Iron and lime phosphates are to be found in the dependencies, also calcareous stone quarries in Grande-Terre. Cattle breeding has developed considerably of late years. The island was discovered by Columbus in 1493, but no colony was founded until Duplessis and de l'Olive landed in 1635 and took possession in the name of France. After being in the possession of the French and English alternately, it was given to the former nation in 1915. There are good roads but only one small railway. A regular steamship service is carried on by both French and English, and there is a telegraph and telephone service on the islands. A wireless station was opened at Desbrelan in 1918. There are good educational facilities, both public and private elementary schools being established. Pop. (1922) 229,839.

Guadiana, a river of Spain, the Zan-

cara, which rises in the prov. of Cuenca, being its head stream. Not far from the Zancara are the lakes known as Los Ojos. The G. flows westward through La Mancha and Estremadura to Badajoz, where it assumes a southerly direction forming a boundary between Spain and Portugal. The river is about 500 m. long, its chief tributaries being the Javalón, Zujar, and Ardila.

Guadix, a city of N. Spain in Granada, situated on the R. Guadix. There are mulberry plantations, and in the vicinity are the warm mineral springs of Graena. It contains a cathedral and the ruins of an old Moorish castle. Pop. about 16,000.

Guaduas, a tn. of Colombia, S. America, situated 45 m. N.W. of Bogota, in the dept. of Cundinamarca, over 3000 ft. above sea level. Pop. about 12,900.

Guagua, a tn. and com. of the island of Luzon, Philippine Is. It is situated in the province of Pampanga. Pop. 10,500.

Guaido Tadino, a com. of Italy in the prov. of Perugia, situated about 58 m. from Ancona, on the road leading to the Furlo Pass. It possesses a noted cathedral. In the vicinity, Totila was defeated by Nurses in 552. Pop. about 11,900.

Guauguay, a tn. in the prov. of Entre Rios, Argentine, about 8 m. from Porto Ruiz. It contains a library, theatre. The slaughterhouses enable it to carry on a trade in meat. Pop. about 16,000.

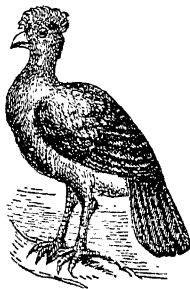
Guauguaychu, a river port in the prov. of Entre Rios, Argentina, situated on the R. Guauguaychu, about 9 m. from its confluence with the Uruguay. This town has a considerable amount of commerce in meat extracts. Pop. about 18,000.

Guam, **Guahan**, or **Guajan**, the largest and most southern of the Ladrone or Mariana Is. The surface is mountainous, the coast being surrounded by coral reefs. The best harbour is Apra on the W. Rice, copra, coffee, cocoa and sugar are cultivated on the island, which, since 1898, has been the property of the United States, and is used as a naval station. The port is closed to foreign vessels of war and commerce except in special cases. There is a wireless station and an irregular mail service. Elementary education is compulsory. The island was discovered in 1521 by Magellan. Cap. Agaña. The area is about 200 sq. m. Pop. about 10,000.

Guamo, a tn. of Colombia, situated to the S.W. of Bogota. Pop. c. 11,000.

Guan, a bird belonging to the family Graciidae, sub-family Penelopinae, native of Central and S. America.

These birds are characterised by bare throats and wattles. They are gregarious birds, and are usually to be found in forests. Their colour is olive-green or brown, and several of the species are capable of being domesticated.



GUAN

Guanabacoa, a tn. of Cuba, 3 m. E. of Havana. It is built on high land and is well provided with public buildings. It is connected by rail and motor road to Havana, of which it is a residential suburb. There are medical springs in the town. Pop. about 16,500.

Guanacaste, a prov. of Costa Rica, including the peninsula of Nicoya. The surface of the province is covered by large forests, and is well provided with land suitable for grazing. The capital is G. or Liberia. Pop. (province) about 52,500; (town) about 3000.

Guanaco, a wild species of the camel family, the llama and alpaca being the domesticated varieties. It is of a reddish-brown colour, and is a native of S. America, found particularly on the Andes and generally living in herds.

Guanajay, a tn. in the prov. of Pinar del Rio, Cuba. It lies 35 m. S.W. of Havana and is noted as a health resort. Pop. about 6000.

Guanajuato: (1) A state of Mexico, bounded on the N. by San Luis Potosi, on the S. by Michoacan, on the W. by Jalisco, and on the E. by Queretaro, with an area of about 10,950 sq. m. This state lies in the central plateau of Mexico, and its surface is very mountainous, the Sierra Gordo and Sierra de G. being the highest ranges. The chief river is the Rio Grande (de Lerma), and the capital G. This state is exceedingly rich in minerals. The silver mines are of the greatest importance, being worked since the Spanish conquest.

Pop. (1921), 860,364. (2) The cap. tn. of the state of G., situated to the N.W. of Mexico. This city consists of a number of villages placed round the mines, and being on uneven ground has steep and winding streets, well-built houses, and a generally Oriental appearance. Among its chief buildings are the Alhóndiga, a cathedral, mint, university, and theatre. In addition to the silver and gold mines which are near, G. manufs. pottery, chemical, and other articles. Pop. about 36,000.

Guanare, the cap. of the state of Zamora, Venezuela. It is noted for its trade in cattle. Pop. about 11,000.

Guanches, or **Guanchos**, the race originally found in the Canary Is. They were finally conquered by the Spaniards about the end of the fifteenth century, and at the present time are nearly extinct. The character of their skull—low forehead and projecting jaw—shows a likeness to the Cro-Magnon race of France, while their language and inscriptions point to a connection with the Berbers of Northern Africa. See Sabin Berthelot, *Antiquités Canariennes ou Annotation sur l'Origine des Peuples qui occupent les Îles Fortunées depuis les premiers Temps jusqu'à l'Époque de leur Conquête*, 1879.

Guanes, a tn. in Cuba, situated in the centre of flourishing tobacco, cotton, and coffee plantations. It is 120 m. S.W. of Havana in the prov. of Pinar del Rio. Pop. 10,500.

Guanine ($C_4H_4N_6O$), a highly nitrogenous base containing the uric acid nucleus found in guano and other animal products. It forms a white insoluble powder which is converted by nitrous acid into xanthine, a substance present in tea.

Guano (derived from the Peruvian word *huano*, dung), the excrement of certain sea-fowl, e.g. gulls, cormorants, and penguins, together with other animal remains such as feathers and bones. It is used largely as a manure, its value as such depending on the fact that it is a general fertiliser yielding all the constituents of plant food in a condition that can be readily assimilated. The chemical composition is extremely complex and varies according to the locality and age of the deposit. The main constituents are nitrogenous (uric acid) and phosphatic (calcium phosphate) compounds, together with various potassium and ammonium salts and a nitrogenous substance, guanine (q.v.). There are three classes of Gs.: (1) Those that come from a hot and rainless climate, the nitrogenous matter being preserved in its original state, e.g. Peruvian G.; (2) those from damp climates which have lost

a large part of their soluble constituents, e.g. Ichaboe, Bolivian, and Chilean Gs.; (3) those consisting merely of the phosphatic remains contaminated with sand, e.g. African, Patagonian, and Australian Gs. The most highly nitrogenous and therefore most valuable G. (containing nitrogen from 13 to 14 per cent., and phosphoric acid to the same amount) has been imported since 1840 from the Chincha Islands off Peru. According to Boussingault, one ton of this is equal to about thirty tons of farm-yard manure or cow-dung. The best supplies of G. are now practically exhausted, and low quality grades are now 'fortified' with ammonium sulphate. In 1850, the import was 117,000 tons, rising to 280,000 tons in 1870, but it has now fallen to about 20,000 tons. Fish Gs. and other artificial fertilisers have now taken the place, to a large extent, of the natural material. These are made by drying and pulverising the bones and heads of fish, often together with superphosphate of lime.

Guantanamo, a tn. in the chief coffee-growing district of Cuba, 13 m. N. of Caimanera, its port, and 49 m. E. of Santiago de Cuba. One of the four naval stations ceded to the United States by Cuba in 1901. Exports sugar and lumber, and has a good harbour. Pop. 13,696.

Guapai, or **Rio Grande**, a river in Bolivia rising in the dept. of Cochabamba. Tributary of the Mamore, into which it runs after a circuitous course of 550 m.

Guarani, **Guaranys**, or **Guaranies** ('warriors'), S. American aborigines, one of the chief groups of S. American Indian tribes, who lived between Parana R. and the Atlantic. The name is also applied to a great linguistic family, Tupi-Guarani, which formerly occupied Paraguay, Uruguay, and Brazil, with branches also in Bolivia and Peru. These numerous tribes were distinguished by the same language and similar customs. They cultivated the manioc and other plants, and had developed various peaceful arts. They were usually friendly with the whites and easily subdued. The modern population of Paraguay are largely descendants of the G. and the Spaniards with whom they intermarried. The Jesuits established important missions among them. The Guarany language has Mongolian characteristics, and was early adopted by missionaries as the 'lingoa geral.' See Martius, *Ethnographie und Sprachenkunde Amerikas*, 1867; Brinton, *The American Race*, 1891.

Guarantee, or **Contract of Suretyship**, a promise to be collaterally re-

sponsible for the debt or default of another person, the principal debtor. It is to be distinguished from an indemnity (*q.v.*) because no liability arises until the principal debtor has made default. A G. is within the Statute of Frauds (*see* FRAUDS, STATUTE OF), and hence is unenforceable unless evidenced by writing; but the writing need not contain any statement of consideration (*q.v.*) given to the surety in return for his G. The practical effect of this is that a surety cannot be successfully sued if he can prove that there has been no consideration, but that where consideration has been given, it is no defence that it is not stated in writing. There is practically no limit to the transactions the performance of which may be guaranteed, although the majority relate to mercantile matters. Gs. are also frequently given to secure the fidelity or honesty of some person newly appointed to some office. A valid contract of suretyship must be made with the creditor, and the guarantor must be under no liability in the principal contract. For example, if a husband and wife go to a furrier, and on the wife buying furs the husband tells the furrier he will see him paid *in any event*, such words may make the husband liable on the contract of sale jointly with his wife, or even solely liable; if, however, he tells the furrier he will pay if his wife declines, that would probably imply a G. A surety who has contracted jointly with other sureties is entitled to contribution from his co-sureties if he pays the whole debt; but he cannot, in the absence of agreement with the creditor to the contrary, compel the latter to sue his co-sureties with him. It seems now to be settled law that a surety cannot compel the creditor to sue the debtor before having recourse to him, for the creditor can sue the surety without even informing him of the debtor's default. Any fraudulent concealment or wilful misrepresentation on the part of the creditor inducing the G. will entitle the guarantor to repudiate the G., and if the creditor alters the terms of the G. without the consent of the surety, the latter is discharged, as also if he takes a new security from his debtor in substitution for the original security. On payment of the debt the surety has the right not only to recover from the principal debtor the full amount of the debt with interest, and costs reasonably incurred in disputing the claim, but to be subrogated to all the rights, equities, and securities given by the principal debtor to the creditor. A discharge in bankruptcy of the principal debtor

or the acceptance by the creditors of a scheme of arrangement does not release from liability a person who was surety for his debts (Bankruptcy Act, 1914). Consult T. Hewitson, *Suretyship*, 1927.

Guarantee Associations, associations or insurance companies which issue policies guaranteeing the assured against the default or insolvency of his debtors; or, specifically, fidelity policies or bonds to guarantee the assured against dishonesty of a servant or employee. Contracts to issue such policies are within the Statute of Frauds (*see* FRAUDS, STATUTE OF), and must therefore be in writing. In the case of fidelity bonds, the employer is bound to disclose to the G. A. any knowledge he may have respecting previous defalcations on the part of the employee whose integrity is the subject of the policy or bond. It is a defence to an action on a fidelity policy that the assured has been negligent in supervising the employee. If during the currency of a fidelity policy the employee is guilty of any dereliction of duty which would justify his dismissal, the assured must give notice to the G. A., even although the conduct of the employee has given rise to no claim upon the policy. Speculation or gambling on the part of the employee must also be disclosed where the policy contains a condition to the effect that the employer must give notice on becoming cognisant of such fact. Guarantee policies against insolvency or default of debtors must be distinguished from ordinary contracts of guarantee. (*See* GUARANTEE.) Full disclosure must be made as in the case of fidelity bonds, whereas in ordinary guarantees such disclosure is not essential. The G. A. is discharged from liability, generally speaking, if the creditor consents to any alteration in the liability of the debtor.

Guarantee Associations (U.S.A.). Policies are issued, guaranteeing the assured against the infidelity of employees in the U.S.A., by Bonding Companies, Surety Companies, and Insurance Offices, some of which, acting on behalf of the employers, make very searching inquiries into the antecedents of the persons to be guaranteed. There are some Surety and Bonding Corporations which specialise in guaranteeing against suffering loss through persons who have been released from court on bail and in other rather unusual forms of surety. It frequently happens that such bodies open the way for difficulty by entering into contracts which are legally outside their powers, but on the whole such undertakings

are entered into in good faith and duly honoured should occasion require it. The word 'guarantee' is also largely used in connection with many of those important Trust Companies, which, during recent years, have made a bid for the banking business of the U.S.A. These Guarantee Trust Companies, acting in the first place as executors, guarantors, security trustees, and in performing similar services, were naturally led by the very nature of their activities into doing much of the work normally undertaken by banking companies, with the advantage that they were not handicapped by the restrictions that U.S.A. law imposes upon institutions describing themselves as 'Banks.' Although this led to ultimate changes in the law that empowered Banking Companies to extend their activities, the Guarantee Trust Companies had received such an impetus that their deposits increased from 300 million dollars in 1891 to 28,217 million dollars in 1929.

Guarayos, aborigines of S. America. They are found chiefly in the forest lands of Bolivia. They have never been fully civilised, and all attempts to bring them under the permanent influence of civilisation have been frustrated by their fierce and barbarous habits. They cultivate maize and plantains.

Guard, National, see UNITED STATES — *Army*.

Guarda, the name of a fortified tn. and dist. in Portugal. The district forms part of the prov. of Beira. It is situated just over 70 m. N.E. of Coimbra. It has a bishop's palace, cathedral, and old castle. Pop. (dist.) 256,243; (tn.) about 6000.

Guardafui, the N.E. extremity of E. Africa, situated at the S. entrance of the Gulf of Aden.

Guardi, Francesco (1712-93), a Venetian painter. His greatest works are to be found in the Manfrini Palace at Venice. He was a pupil of Canaletto, whose style he followed closely.

Guardiagrele, a city in the prov. of Chieti, Italy, 18 m. S.W. of Ortona, and possessing mineral springs. Pop. (commune) 10,000.

Guardian, *The*, a newspaper founded in 1846 by R. W. Church (afterwards Dean) and Frederick Rogers (afterwards Lord Blatchford), and a few other enthusiasts, to keep the flag flying after the secession of Newman. The first editor was Martin Richard Sharp, 'a model editor, shrewd, practical, courteous, and an admirable judge of men.' The paper made an early success, enlisting distinguished contributors from the first,

and has long been accepted as the representative journal of the Eng. Church. With it is now incorporated the *Churchman* (1903).

Guards (Household Troops) (from Fr. *garde*). G. form the oldest part of established armies, in fact it is probably from the G. that the army, as we know it, is derived. Formerly it was customary for the sovereign to depend upon the national levy for his soldiers, but gradually there grew up the nucleus of a standing army in the formation of bodies of personal G. for the king. In England these took the form of the house carles, a body probably first brought into England by Cnut. History gives us many examples of G. playing an important part in the affairs of their country. In this respect we may mention the house carles of Harold who died to a man practically round his body at Hastings; the Swiss G. of Louis XVI., who perished defending their king, and the Old Guard of Napoleon, the veterans upon whom he depended when all else had fallen. These are but a few examples. The G. of the king at the present time may be distinctly divided into two groups: The first, those gentlemen and retainers who form a purely *personal* bodyguard, and secondly, those regiments which are brought into closer contact with the sovereign than usual, but who form part of the active army as well. To the first division belong the Honourable Corps of Gentlemen-at-Arms, the Yeomen of the G., together with the Royal Company of Archers, who form the King's Scottish bodyguard. The two former owe their origin to the Tudor monarchs. The oldest of all these bodies is the Yeomen of the G., founded by Henry VII. Next came the Honourable Company of Gentlemen-at-Arms, founded at the accession of Henry VIII. The Scottish Company of Archers was founded by Act of the Privy Council of Scotland during the reign of Charles II. The second section of G. consists of certain regiments from the active army. These, again, may be divided into two sections: the Household Cavalry and the Foot G. The Household Cavalry was founded at the Restoration. There are three regiments of Household Cavalry which were, originally at the Restoration, the King's Troop, the Queen's Troop (formerly the Lord-General's Troop), and the Duke of York's Troop. Later, the name of the Life G. was given to the first two troops (1685) and finally was raised a third troop, known variously as the Duke of York Blues, the Royal Horse G. Blue, and the Royal Horse G. (the

Blues). (See **LIFEGUARDS**.) The Foot G. of the Household Troops consist of five regiments: the Grenadiers, the Coldstreams, the Scots G., the Irish G. and the Welch G. (See also under the names of the regiments.)

Guardship, the name applied to a ship which is posted at some port to act as guard. Usually she is the headquarters of the various coastguard districts and is stationed at a certain point with a nucleus crew. The crew can easily, however, be brought up to strength, and can then proceed immediately to action. The name of guard boat is also applied to a boat which sails round an anchored fleet at night in order to see that proper watch is being kept. Formerly the term was applied to that ship of the fleet which received the men from the press-gangs.

Guarico, the name of a state of Venezuela. It was formed in 1901 from a portion of the state of Miranda. It has an area of about 25,500 sq. m., and its capital is Calabozo. Pop. about 122,190.

Guarini, Giovanni Battista (1537-1612), a poet, b. at Farrara, and remembered for his drama, *Il Pastor Fido*, which he wrote under the influence of Tasso. The poem has been translated into Eng. See Monograph by Rossi, 1886.

Guarino (c. 1370-1460), a scholar, b. at Verona. He is chiefly remembered for having helped greatly to establish the texts of many of our classics. He translated Strabo and some of the lives of Plutarch. See Life by Sabbadini, 1891.

Guarneri, the surname of a famous Italian family of violin-makers who lived and worked at Cremona:

Andrea Guarneri (1626-98), a pupil of Nicholas Amati, whose marriage he witnessed in 1641. Many of his violins are of the Amati pattern, but are inferior to those of his master; his cellos possess fine acoustic properties.

Giuseppe Guarneri (1666-1739), son of Andrea G., introduced a narrow-waisted and more boldly curved instrument, with the sound-holes set lower down, and in its power of sound is superior to his father's.

Pietro Guarneri (c. 1690-1728), second son of Andrea G., introduced greater width between the sound-holes; his varnish was of exquisite gold and pale red tints.

Pietro Guarneri (c. 1725-60), a son of Giuseppe G., who produced some very fine instruments.

Giuseppe Antonio Guarneri (1683-1745), a nephew of Andrea G., and greatest genius of the family. His violins are of bold and massive build,

with grand sonority of tone, and some of his finest date from about 1740.

Guarroman, a tn. in prov. of Jaen, and 28 m. N. of town of same name, Spain. A lead-mining centre. Pop. 3500.

Guastalla, an anct. city of N. Italy, situated on the R. Po., about 20 m. N.E. of Parma. It has a cathedral and a school of music. It is the seat of a bishop. Pop. 11,000.

Guatemala: (1) Republic of Central America. The name is probably of Aztec origin and is said to mean 'land of the eagle' in its original form of Quauhtematlan. It is bounded by Mexico, British Honduras, Honduras and Salvador. It is divided into five regions, the lowlands of the Pacific coast, the volcanic mountains of the Sierra Madre, the plateaus N. of these, the mountains of the Atlantic versant, and the plain of Peten. It is richly watered and there are several extensive lakes. The bird life of the country is rare. The climate is healthy, save on the coast, where fever is prevalent. The country is very rich in minerals and in rubber, as well as in vegetable products, the chief of these being coffee, bananas, sugar, timber, maize and cotton. Important cattle estates exist upon the Pacific coast and cattle and hides are exported besides the above-mentioned products. No part of Central America contains a greater diversity of tribes. There are eighteen languages spoken. The chief town is Guatemala la Nueva. The prevailing form of religion is Rom. Catholic, but the state recognises no distinction of creed. No convents or monasteries are allowed. For the white and mixed population military service is compulsory. G. is a republic, established in 1847. Under the Constitutional Charter of 1923 the President is elected for a term of six years; three nominees are elected by the National Assembly to replace the President in given contingencies. The Assembly consists of deputies for each 30,000 inhabitants; it declares war, governs national finance and controls concessions. There is direct communication by rail with the U.S.A. and Mexico and a line is now open into the neighbouring Republic of Salvador. There is an electric line under construction from San Felipe to Quezaltenango. Road-making has increased of late years and there are excellent roads radiating from G. city. There is a wireless station, telegraph and telephone. There are regular mails to England and the U.S.A. and small steamers and motor boats ply on the rivers and lakes. There are wonderful ruins of anct. settlements to be found

belonging to three civilisations—the Aztec, the Maya and a third nameless one still older. G. was conquered by the Spaniards under Pedro de Alvarado, between 1522 and 1524. Pop. 2,454,000 (60 per cent. Indians).

(2) Capital of the Republic. G. (sometimes written Guatemala la Nueva and formerly Santiago de los Caballeros de Guatemala), until 1821 capital of the Spanish captaincy-general of G., which comprised Chiapas in Mexico and all Central America except Panama. G. is built more than 5000 ft. above sea-level, in a wide table-land traversed by the Rio de las Vacas, or Cow R., so called from the cattle introduced here by Spanish colonists in the sixteenth century. The edge of the table-land is marked by deep ravines. Beyond it are lofty mountains, the highest peaks being on the S., where the volcanic summits of the Sierra Madre exceed 12,000 ft. It has a station on the trans-continental Railway from Puerto Barrios on the Atlantic (190 m. N.E.) to San José on the Pacific (75 m. S. by W.) and to Champerico via Retahuleu; connection is made at Ayutla with the National Railways of Mexico. It is three times the size of any city in the republic and has a corresponding commercial superiority. Its archbishop is the primate of Central America (excluding Panama). Like most Spanish-American towns it is laid out in wide and regular streets which are often planted with avenues of trees, and it has large suburbs. Though usually only of one storey, the houses are solidly and comfortably constructed. Many of them have large gardens and courts surrounding them. In 1918 a severe earthquake destroyed many of the public buildings which have not yet all been restored, though in the business quarter many fine new buildings have been erected. The chief of the open spaces is the Plaza Mayor which contains the cathedral. This was built in 1730; then there are the archiepiscopal palace, the gov. buildings, the mint, and other public offices; and the more modern Reforma Park and Plaza de la Concordia, now the favourite resort of the inhabitants. There are a number of schools for both sexes, besides hospitals and an orphanage. Many of the principal buildings in the place were originally convents. In 1858 a theatre was founded. This is one of the best in Central America. A museum founded in 1734 is maintained by the Sociedad Economica, which in various ways has done great service to the city and to the country. There are a couple of fortresses, the Castillo Matamoros,

built by Rafael Carrera, and the Castillo San José. Water is brought from a distance of about 8 m. by two old aqueducts from the towns of Mixco and Pinula; municipal improvements to the drainage and water supply are being considered; fuel and provisions are largely supplied by the Pokoman Indians of Mixco. The general prosperity of G. has secured for it the name of the Paris of Central America. It is lit by electricity. A new highway through Antigua to San José was opened in 1925. The foreign trade is largely controlled by Gers. Pop. 116,000.

Guatemala Antigua (old Guatemala) is situated 20 m. S.W. of the present cap., 5000 ft. above sea level. It was once a splendid city, but it has been destroyed several times by earthquakes. In the eighteenth century it had a pop. of 80,000, a university, and over 100 churches and monasteries. The present town is surrounded by picturesque coffee estates. Pop. 10,000.

Guatusos, aborigines of Central America, a S. branch of the Chorotegans, whose home is in Costa Rica. They are generally a peaceful race, and still retain their primeval tribal arrangements and their independence.

Guava, or *Psidium Guajava*, a species of Myrtaceæ found in tropical America. It is a tree which bears white flowers, followed by a succulent edible yellow fruit which is often used in making jellies and preserves. The black G. is *Guetarda argentea*, a species of Rubiaceæ.

Guayama, a tn. of Porto Rico. The tn. is situated in the centre of the cane-growing industry, and has a large trade in molasses, sugar, and rum. Pop. about 14,000.

Guayaquil, the chief port of Ecuador, S. America. It is the cap. of the prov. of Guayas, and is 40 m. from the mouth of the river of that name. The climate is extremely unhealthy, and the town is badly built. The newer part of the town where the richer residents live is far better than the old. The streets of the old town are dirty and badly paved. Much improvement has been made recently; the sanitation is modern and the conditions of public health are satisfactory from May to Dec. The town is the seat of a bishop, and has a cathedral, a bishop's palace, a university, a technical school and three theatres. The chief exports are cacao, Panama hats, cotton, tobacco, and coffee. It has also large shipbuilding yards, steam saw-mills, foundries, machine shops and breweries. The snow-capped peak of

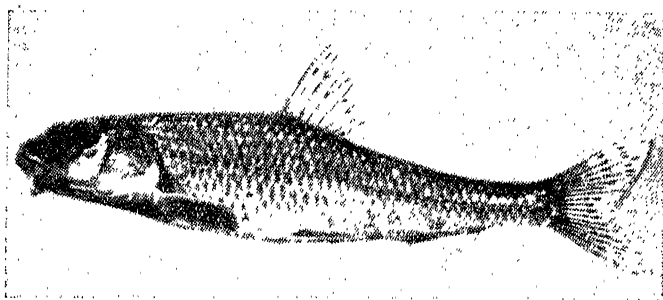
Chimborazo can sometimes be seen from the city. Pop. 100,000.

Guayaquil, Gulf of, an inlet of the Pacific Ocean on the W. coast of S. America.

Guayas, a stretch of ter. on the S.W. coast of Ecuador forming a prov. of that country. The land is generally low-lying and is extremely fertile. The chief products are coffee, tobacco, sugar cane, and rice. Area 11,500 sq. m.; pop. 150,000.

Guaymas, a Mexican seaport situated on the Gulf of California in the State of Sonora. The chief exports are pearls and silver ore. The climate is unpleasant in summer. It is in regular communication with the other Pacific ports of Mexico by means of a service of coasting steamers. Sea-fishing is good. Pop. 15,000, including a number of Chinese.

Gude, Hans Frederic (1825-1903), a Norwegian painter, pupil of the Dusseldorf Academy (1841), and professor there (1854). He went to England (1862), and became professor at Karlsruhe arts school (1864), and at Berlin Academy (1880-1901). He is perhaps the finest Norwegian landscape painter, and won numerous medals in Europe and America. Among his chief works are: 'Early Morning in the Mountains of Norway,' exhibited 1873; 'A Scotch Landscape,' exhibited 1878; 'Bridal Procession on Hardanger Fjord,' 1848; 'Calm Sea'; 'Fishing by Night'; 'Fishermen Landing'; 'A Viking Ship'; 'After the Storm'; 'Harbour of Christiania,' 1881. See Atkinson, *Art Tour to the Northern Capitals of Europe*; Dietrichson, *Af H. Gude's Liv og Værker*, 1899.



GUDGEON

Guayra, La, see LA GUAYRA.

Gubat, a small port on the E. coast of Albay prov., Luzon, Philippine Is. Exports copra and hemp. Pop. 16,500.

Gubbio, a city of Central Italy, 27 m. S. of Urbino in the prov. of Perugia, delightfully situated on the slopes of the Apennines. It has a picturesque medieval appearance with its thirteenth-century cathedral, a communal palace of the fourteenth century, and many old convents and churches. G. was celebrated for its majolica ware, which is still imitated in a few factories. The famous Eugubine Tables are kept here. Since its incorporation in the duchy of Urbino (1384) the pop. has dwindled from 30,000 to 6300.

Guben, a walled manufacturing tn. in Prussia on the Neisse, 28 m. S. of Frankfort-on-the-Oder. Industries: woollen, linen stuffs, hats, machinery, earthenware, dolls. Pop. 38,800.

Gubernatis, Angelo de, see DE GUBERNATIS, ANGELO.

Guden-Aa, the chief river of Jutland, Denmark, about 80 m. long. It flows N.E., joining the Kattegat by an estuary 1 m. wide, about 16 m. N.E. of Randers.

Gudgeon, a cyprinid fish of Europe and Northern Asia. Rarely exceeds seven in. in length. Has a barbel on each side of jaw, and is greyish, with dark blotches. It prefers clear streams with gravelly bottoms.

Gudrun, or Kudrun, a heroine of a Middle High Ger. thirteenth-century epic (author unknown), the Ger. *Odyssey*, next important in Early Ger. literature to the *Nibelungenlied*. She was the daughter of King Hettel of Heseligen (Friesland). The epic deals with legends mainly of the N. Sea coasts and Normandy. Martin's edition (1902) is the best modern one. There are modern Ger. versions by Slimrock (1843), Freytag (1888), Lemmermayer (1890), Legerlotz (1900), and others. See Wilmann's *Die Entwicklung der Kudrundichtung*, 1873.

Guebres, Guebers, Gabers, or Ghebres (Persian *ghebr*. Cf. *Giaour*), a name (meaning infidels) applied in Persia to the adherents of the anct. religion, Fire-worshippers, Zoroastrians, or Parsis. They number about 8000 or 10,000, and call themselves Beh-Dinān ('those of the Good Faith'). See Tylor, *Prim. Cult.*, ii., 1871; Lovell's trans. of *Thevenot's Trav.*, 1687.

Guelderland, see GELDERLAND.

Guelder-rose, or *Viburnum Opulus*, a beautiful species of Caprifoliaceæ, a marsh shrub common to N. Europe and to Britain. The petals are large, and when cultivated the flowers are neuter; because of its white balls of flowers the G. is called also the snow-ball tree.

Guelph, a city of Ontario, Canada, cap. of Wellington co., on the Speed. It is built on a number of hills, 45 m. W. by S. of Toronto by rail. It is served by the Canadian Pacific Railway and the Canadian National Railway. An inland port of entry and seat of the Ontario Agricultural College and the Macdonald Institute. It is an agricultural district. Manufs. sewing machines, pianos, organs, and woollen goods. There are also linen mills and limestone is quarried in the neighbourhood. John Galt, the Scottish author, founded the town. Pop. 18,128.

Guelphs and Ghibellines. These names are the Italianised forms of the Ger. words Welf and Waiblingen, although one tradition says that they are derived from Guelph and Gibel, two rival brothers of Pistoia. Another theory derives Ghibelline from Gibello, a word used by the Sicilian Arabs to translate Hohenstaufen. A more popular story tells how, during a fight round Weinsberg in Dec. 1140, between the Ger. king, Conrad III., and Welf, Count of Bavaria, a member of the powerful family to which Henry the Lion, Duke of Saxony and Bavaria, belonged, the soldiers of the latter raised the cry 'Hie Welf,' to which the king's troops replied with, 'Hie Waiblingen,' this being the name of one of Conrad's castles. The rivalry between Welf and Hohenstaufen, of which family Conrad was a member, was anterior to this event, and had been for some years a prominent fact in the history of Swabia and Bavaria, although its introduction into Italy, in a modified form, dates from the time of the Italian expeditions of the Emperor Frederick I. Chosen Ger. king in 1152, Frederick was not only nephew and heir of Conrad, he was related also to the Welfs; yet although his election abated to some extent the rivalry between Welf and

Hohenstaufen in Germany, it opened it upon a larger and fiercer scale in Italy. During the period covered by Frederick's Italian campaigns, his enemies became known as Welfs, while his partisans seized upon the term of Waiblingen or Ghibelline, and the contest between the two parties was carried on with a ferocity unknown even to the inhabitants of S. Germany. The story of the contest between Guelph and Ghibelline is nothing less than the history of Italy in the Middle Ages. At the opening of the thirteenth century the contest was intensified by the fight for the Ger. and Imperial thrones between Philip, Duke of Swabia, a son of Frederick I., and the Welf, Otto of Brunswick, afterwards the Emperor Otto IV. A fight waged in Italy as well as in Germany. Then, as heir of Philip of Swabia, Frederick II. was forced to throw himself into the arms of the Ghibellines, whilst his enemies, the popes, ranged themselves definitely among the Guelphs, and soon Guelph and Ghibelline became synonymous with supporter of pope and emperor. After the death of Frederick II. in 1250, the Ghibellines looked for leadership to his son, the Ger. king, Conrad IV., and then to his natural son, Manfred, whilst the Guelphs called the Fr. prince, Charles of Anjou, to their aid. The combatants were nearing exhaustion, and after the execution of Conrad in 1268, this great struggle began to lose force and interest. Guelph and Ghibelline were soon found representing local and family, rather than papal and imperial interests. In the fifteenth century the two names began to die out of current politics. When Louis XII. of France conquered Milan at the beginning of the sixteenth century, the old names were revived. The Fr. king's supporters were called Guelphs, and the friends of the Emperor Maximilian I. were referred to as Ghibellines. The Guelph party meant the burghers of the consular communes, the men of industry and commerce, and the Ghibelline party meant the men of arms and idleness. Dante was a Ghibelline and Petrarch was a Guelph.

Gueraude, a picturesque old Fr. tn., situated 47 m. W. by N. of Nantes in the dept. of Loire-Inférieure. It is near the sea, and has a handsome mediæval church. Pop about 7000.

Guercino ('squint-eyed'), the nickname of Giovanni Francesco Barbieri (c. 1591-1666), b. at Cento, in Ferrara. He belongs to the class of self-taught geniuses, and his works are distinguished by three different styles, which he followed at different

periods of his life. He first followed the school of the Zenobrosi, which is conspicuous for its daring contrast of light and shadow; his second style was a modification of this, and was more refined and elevated; his masterpiece, 'St. Petronilla,' is in this style; in his third he became a follower of Guido and lost his own original power. He painted numerous pictures which are mostly in oil.

Guéret, a tn. in France, cap. of the dept. of Creuse, which grew up round an abbey founded in the seventh century. Its chief industries are brewing, leather-making, the manuf. of basket-work and wooden shoes. Pop. about 6000.

Guerillas, the name given to bands of armed men who carry on an irregular warfare on their own account. They belong peculiarly to Spain, and in 1808-14 they fought against the Fr. Some joined Wellington and rendered him service, but when peace was concluded formed themselves into robber bands. Guerilla warfare was dealt with at The Hague Conference in 1899, and the rules made were reaffirmed in 1907.

Guérin, Georges Maurice de (1810-39), b. at La Cayla, Languedoc, and educated at the Collège Stanislas, Paris, intending to study for the Church of Rome, but coming temporarily under the influence of Lamennais at La Chênale (near Dinan) he renounced that intention (1833). On his return to Paris he became for a short time teacher at his own college. His marriage, in 1838, to a young, beautiful, and rich Creole, placed his time at his disposal until his death, from consumption, eight months later. George Sand's warm appreciation in the *Revue des Deux Mondes* (May 1840) was the first public recognition of his genius. His *Reliquia*, letters, poems, etc., were published in 1860, edited by G. S. Trébutien; to this edition appeared as preface the famous critique of Sainte-Beuve, who regards him as a spiritual kinsman of Bernardin de Sainte-Pierre. G. seems to have been incapable of the deep passions of love; there is a platonic serenity about him which reminds one of Fogazzaro, but his writings, although not wholly devoid of a tendency to morbid sentimentalism, are unique in their exquisite appreciation of the pagan beauty, the harmony and pathos of Nature. See Matthew Arnold's *Essays in Criticism*.

Guérin, Pierre Narcisse, Baron (1774-1833), a Fr. historical painter, b. in Paris. He studied under Regnault, and in 1797 obtained one of

the three prizes at a competition. In 1799 he exhibited his 'Return of Marcus Sextus,' in which he reached the highest point of his art. In 1803 he received the cross of the Legion of Honour, and in 1816 was appointed director of the Fr. school at Rome. G.'s paintings in their own style are very beautiful, but his earlier productions are more vigorous than his later ones. His chief works are: 'Hippolytus and Phædra'; 'Pyrrhus and Andromache'; 'Æneas and Dido'; 'Clytemnestra'; 'The Revolt of Cairo'; 'Ulysses'; 'Death of Marshal Launès.'

Guernsey, the second in size of the Channel Isles, lies 30 m. from the coast of Normandy. It is triangular in form, with an area of 25 sq. m., and its surface slopes from S. to N. The climate is mild and healthy, and the soil, when manured, is very fertile. The chief crops are vegetables, wheat, barley, and apples for cider, but oranges, melons, and figs are also grown, as well as large quantities of grapes and tomatoes. The island, too, produces a famous breed of cows, and a special sort of granite, almost unrivalled for paving, is exported from St. Sampson's. The chief town is St. Peter's Port. Pop. (1921) 38,315.

Guernsey Lily, or *Nerine Sarniensis*, a Cape plant belonging to the order Amaryllidaceæ. The flowers are of a delicate pink colour.

Guerrazzi, Francesco Domenico (1804-73), an Italian author, b. at Leghorn. He studied law in Pisa University, and practised for a time at Leghorn, but soon abandoned this in order to devote himself to literature and politics. His first published work was *Buttaglia di Benevento*, 1827, an historical novel which is remarkable for its exquisite expression; his *Assedio di Firenze* was written while he was in prison at Ponto-ferrato, 1834. This is perhaps his most important work, and tells of the downfall of the republic of Florence. G. was frequently engaged in republican conspiracies and imprisoned, and was the most powerful Liberal leader at Leghorn. In 1848 he became a minister, and in 1849, when the grand duke of Tuscany fled, he was proclaimed member of the provisional gov., and subsequently dictator. On the restoration, however, he was imprisoned for three years, but released in 1852 and banished to Corsica. His other works are: *Apologia*, his defence; *Isabella Orsini*; *Beatrice Cenci*.

Guerrero, a coast state of Mexico, between the R. de las Balzas-Mexcala and the Pacific. It is very mountainous, and has great mining capabilities, the minerals found here being silver,

gold, mercury, lead, iron, coal, sulphur, and precious stones. The agricultural products are cotton, coffee, tobacco, and cereals. Capital Chilpancingo; chief port Acapulco. Pop. 531,565.

Guesclin, Bertrand du (c. 1320–80), a constable of France, *b.* in Brittany. He was of a persistent and turbulent character, and was renowned for his prowess even when a boy. He fought for Charles de Blois at Vannes in 1342, when he was contesting for the dukedom of Brittany, and distinguished himself against the Eng.



BRIDAN'S STATUE OF
DU GUESCLIN

at Rennes, 1356, and Dinan, 1357. In 1359 he took Melun and freed the Seine from the Eng., and in 1364 won the Battle of Cocherel against Charles the Bad, but was taken prisoner by Sir John Chandos at Auray. On being released he fought against Pedro the Cruel, but was defeated and taken prisoner by the Black Prince, 1367. Being ransomed he defeated and captured Pedro in 1369, and in 1370 was made constable of France by Charles V., with the result that in a few years nearly all the Eng. possessions were in the hands of the Fr.

Guesde, Jules (really Mathieu Basile

G.) (1845–1922), Fr. Socialist leader; *b.* Nov. 11, in Paris. At first an official in the Ministry of the Interior (1863). For protesting against Napoleon III.'s policy of war with Prussia, he suffered four months' imprisonment. On the fall of the Empire, he founded a paper, *Les Droits de l'Homme*; which enthusiastically supported the Commune. For a series of articles he wrote, he was sentenced to five years' imprisonment—which he avoided by going abroad. He was mostly at Geneva, where he conducted *Le Réveil international*; and, when he returned to France under amnesty in 1876, he was a Marxian socialist. He founded *Egalité*—the first collectivist paper to appear in France. In 1878 he was arrested for attempting to hold a forbidden socialist convention; but in 1880, at a Labour Congress at Havre, the resolution drafted by G. and Lafargue, on Marxian lines, was carried; and, when the Fr. socialist movement split, he led the orthodox section. The International Socialist Congress at Amsterdam, 1904, resolved, at G.'s instance, that socialists must not participate in a capitalist gov. But G. himself—usually in the Chamber from 1893—joined the Viviani cabinet on the outbreak of the Great War, and remained a member (without portfolio) till Oct. 1915. Died at Saint Mandé, July 28.

Guest, Lady Charlotte, afterwards Schrieber (1812–95), the daughter of the ninth Earl of Lindsay, was famous as a collector of fans and china. She presented some fine china and earthenware to the South Kensington Museum. She published several volumes containing pictures of her most notable fans and the playing cards of all nations, as well as several old Welsh manuscripts, one of which, *Mabinogion*, appeared in 1849.

Guest, Edwin (1800–80), an historical writer, *b.* at King's Norton, Worcestershire. He was educated at King Edward VI.'s Grammar School, Birmingham, and Caius College, Cambridge, and was made a fellow of Caius in 1824. He afterwards went to Weimar and made the acquaintance of Goethe. His first published work was the *History of English Rhythms*, in 1838, the second edition of which appeared in 1882 edited by Professor Skeat. G. was practically the founder of the Philological Society, and was secretary in 1842. He was elected F.R.S. in 1839, and master of Caius College in 1852. His writings are of great value in the study of Roman-British history and include *On Julius Caesar's Invasion of Britain*; *The Campaign of Aulus Plautius in Britain*, etc.

Guest, Keen and Nettlefold, Ltd., was registered July 9, 1900, as Guest, Keen and Co., Ltd. to take over the various interests of the Dowlais Iron Co., Messrs. Guest and Co., and the Patent Bolt and Nut Co. When the firm of Nettlefold's was acquired in 1902 the name was changed to the present title. The firm has large interests in collieries and iron works. The Chairman is Sir J. F. Beale and the Registered Offices are London Works, Birmingham. The company controls, either wholly or jointly, the businesses of John Lysaght, Ltd.; Bayliss, Jones & Bayliss, Ltd.; Guest, Keen and Piggotts; and the Meiros Collieries, Ltd. The share capital is £15,000,000 and the reserve £1,781,434.

Gueux, Les, or The Beggars, the name assumed by the malcontents who opposed the introduction of the Inquisition into the Netherlands. They formed themselves into an association in 1565 and presented a petition to the regent, Margaret of Parma, 1566. The regent being at first afraid, one of her councillors asked her what she had to fear from 'beggars' (*gueux*). The word was remembered and the party adopted it. They maintained a vigorous warfare against Philip for some time, but were finally suppressed by the Duke of Alva. 'The Beggars of the Sea,' under Count de la Marek, did much damage to the Spanish fleet and captured Briell in 1572, a victory which ultimately resulted in the independence of the Netherlands in 1648.

Guevara, Antonio de (c. 1490-1545), a Spanish theologian and historian, b. at Viscaya. His early years were passed at the court of Isabella, but in 1528 he entered the Franciscan order and subsequently became historiographer and court-preacher to Charles V. In 1529 he published his *Dial for Princes*, a didactic novel professing to be a life of Marcus Aurelius. This work has been translated into Latin, Italian, Fr., and English, and reprinted several times in Spanish. He also wrote *Lives of the Ten Caesars* and *The Golden Letters*—this, too, has been translated into English. G. had considerable influence upon the Spanish prose of the sixteenth century, and his bombastic style may be compared with the euphuism of Lyly, who may have taken G. as his model.

Guevara, Luis Velez de (1570-1644), a Spanish dramatist and novelist, b. at Beja in Andalusia. He practised as an advocate for some years, but came under the notice of Philip IV. and was appointed court chamberlain. He wrote a great number of plays, of which *Reinar*

despues de morir, *Más pesa el rey que la sangre*, *La Luna de la Sierra* are the best; but he is chiefly famous for his fantastic novel, *El Diablo Cojuelo* (the limping devil), which is the basis of Le Sage's *Diable Boiteux*.

Guglielmi, Pietro (1727-1804), an Italian musical composer, b. at Massa Carrara. He studied under Durante and produced his first operatic work at Turin in 1755. In 1762 he went to Dresden to conduct the opera there, and some years afterwards appeared in London. In 1793 he became musical director at the Vatican. He was a writer of operas, both comic and serious, as well as of oratorios and orchestral pieces. His best operas are *La Didone*; *Enea e Lavinia*; *I due Gemelli*; *La Pastorella Nobile*; *La Bella Pescatrice*.

Guiana, see BRITISH, DUTCH, and FRENCH GUIANA.

Guibert of Nogent (1053-1124), an historian and theologian, b. at Clermont-en-Beauvoisis. In 1104 he was chosen head of the abbey of Notre Dame de Nogent. He wrote his *Autobiography*, which contains some very fine pictures of the customs in his day; and a history of the First Crusade, *Gesta Dei per Francos*.

Guicciardini, Francesco (1483-1540), the celebrated Italian historian and statesman, b. at Florence. Marsilio Ficino held him at the font. He came of a noble and illustrious family. After the usual education of a boy, his father sent him to the universities of Ferrara and Padua, where he stayed till 1505. The death of an uncle who had occupied the see of Cortona caused the young man to hanker after an ecclesiastical career. He saw the scarlet of a cardinal awaiting him. His father checked the ambition, declaring that the church was too corrupt to receive any of his sons. The youth then turned his attention to law, and at twenty-three was appointed to read the Institutes in public. Soon after he became betrothed to the daughter of Alamanno Salviati. He was then practising at the Bar, where he won distinction and was entrusted with an embassy to the court of Ferdinand the Catholic. Thus he entered upon the real work of his life as a diplomat and a statesman. He was ambitious, a time-server, and a place seeker. In 1515 Leo X. took him into service and made him governor of Reggio and Modena. In 1521 Parma was added to his rule; and in 1523 he was appointed vice-regent of Romagna by Clement VII. These rendered him virtual master of papal states beyond the Apennines. In 1526 Clement gave him still higher rank as lieutenant-general of the papal army. In

1531 he was advanced to the governorship of Bologna. This post he resigned in 1534, preferring to follow the fortunes of the Medicean princes. Though he served popes through twenty years, his hatred of the papacy was great. He did not hesitate to place his powers at the disposal of the most vicious members of the house of Medici for the enslavement of Florence. When he returned to inhabit it in 1534 it was as the creature of the dissolute Alessandro de' Medici. After the murder of Duke Alessandro in 1537, he espoused the cause of Cosimo de Medici, who, displaying the genius of his family for politics, dismissed him, and he retired in disgrace to his villa, where he spent his last years in the composition of the *Storia d'Italia*.

Guicowar, Garkwar, or Gäckwār, the title of a powerful Mahratta prince, ruler of the state of Baroda in western India. It was originally a family name, and is derived from the word meaning cow, though the family are not of low caste, but belong to the Mahrattas proper. The dynasty was founded in the first half of the eighteenth century by Damaji I., Pilaji, who gradually acquired authority over Gujarat, and Damaji II., who threw off his allegiance to the Peishwa.

Guide-books have not long been in existence. The first were Ebel's *Anleitung* for Switzerland, 1793; Boyce's *Belgian Traveller*, 1815, and Mrs. Mariane Starke's *Directions for Travellers in Italy*, 1820; but the most famous writer of a G. is Wordsworth, whose *Guide to the English Lakes* was published in 1822. In 1836 Murray published his handbook for Holland, Belgium, and North Germany, and this was followed by Baedeker's Ger. guide to Holland and Belgium. Baedeker's G. are now numerous, and can be used by all travellers, English as well as foreign, for translations are available. Other notable G. are those of Yoanne, for France, Gsell Fels, for Italy, Tomsberg, for Norway, as well as those published by A. and C. Black, Ward, Lock & Co. (Illustrated Guide Books), Stanford (Tourists' Guides), Macmillan (Highways and Byways), Adams (Bradshaw's Illustrated Handbooks).

Guidi, Carlo Alessandro (1650-1712) an Italian poet, b. at Pavia. He is important as being the chief founder of the academy called L'Arcadia. He is essentially a lyric poet, his songs being written with singular force and charm. The most beautiful perhaps is *Alla Fortuna*. He also wrote *Amalasundia in Italy*, a lyric tragedy; and *Daphne* and *Endymion*, two pastoral dramas.

Guido d'Arezzo, or Guido Aretinus (c. 990-1050), a musician of the eleventh century, who has been called the father of modern music. He was a monk in the Benedictine monastery of Pomposa, where he taught singing, and invented the principle in which the stave is based. He introduced the names, ut, re, mi, fa, sol, la, for



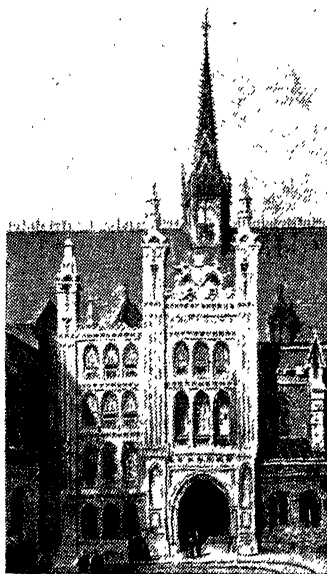
GUIDO D'AREZZO AND HIS PROTECTOR, BISHOP THEODAL, PLAYING ON A MONOCHORD

the first six notes of the scale, adopting them from a hymn in honour of St. John the Baptist. He is also said to have introduced the F clef. His doctrines are explained in *Micrologus* and *Antiphonarium*.

Guido Reni, commonly called **Guido (1575-1642)**, an Italian painter, b. at Calvenzano, near Bologna. He studied under Denis Calvaert, but afterwards entered the studio of the Carracci, one of whom he accompanied to Rome. Here he came under the influence of Carravaggio, and also began to study the works of Raphael, and soon afterwards painted 'Aurora preceding the Chariot of Apollo,' which is usually considered his greatest work. He also painted 'St. Cecilia,' 'The Crucifixion of St. Peter,' 'St. Michael,' and 'Ariadne and Fortune,' while in Rome. He spent some time in Naples in 1621, and began his famous picture the 'Nativity,' and also visited Bologna and the other towns of N. Italy. As a painter he is remarkable for the

purity of his colouring and his dramatic force, while as an engraver he was bold and free in execution; and his works in this direction are as graceful as his paintings. It was only in his later years that his work declined, and this was owing to rapidity of execution.

Guienne, or Guyenne, the largest of the ancient provinces of France, which in the twelfth century formed with Gascony the duchy of Aquitaine. It came into the hands of the English when Henry II. married Eleanor of Aquitaine, but was finally united to France by Charles VII. in 1451.



THE ENTRANCE TO THE GUILDHALL,
LONDON

Guildford: (1) A municipal bor. and cap. of Surrey, England, 30 m. S.W. of London, at the E. end of the Hog's Back, on R. Wey. It is served by the Southern Railway and has water communication with the Thames and with Godalming. Its first known charter dates from 1256, and there are many interesting old buildings. Chief is the Norman keep of the royal castle (c. 1150). The grammar school dates from the sixteenth century (Edward VI. foundation); Trinity Hospital was founded

by Archbishop Abbot in 1619; there is a ruined fourteenth century chapel, and the town-hall dates from 1683. The Church of St. Mary contains some curious frescoes. G. is the seat of the suffragan-bishop of Winchester, and was a royal residence in Plantagenet times. It is noted as a grain-market. Pop. (1921) 24,926. (2) A tn. of W. Australia, on Swan R., 10 m. from Perth. Pop. about 1400 (district, 4000).

Guildhall, an important public building of London, the place of assembly for various courts (court of common council, court of aldermen, chamberlain's court). Originally begun in 1411, the building was partly destroyed by the fire of 1666, receiving its present form in 1789, with G. Dance for architect. It has an ancient crypt. (*See Loftie, London City*, 1891.) It is famous for civic conclaves and banquets, being first used for this purpose in 1500, when Sir J. Shaw gave the Lord Mayor's feast. (*See Price, Guildhall*, 1886.) In a general sense, G. is the hall where guilds and corporations usually meet, corresponding to a town-hall.

Guilds, or Gilds. The origin of gilds, which played so important a part in mediæval city life, dates back to very early times, when small family groups, united solely by kinship, became merged in larger communities. We find among the Anglo-Saxons 'frith-gilds,' associations of freemen for mutual aid. London had a union of such societies, with the 'Knights-gild' at their head, and there were 'Thane-gilds' at Cambridge and Canterbury. Even before the Norman Conquest the lithsmen or shippers' gild of London had considerable importance, but religious and merchant gilds only came into prominence later, as trade and wealth increased. The former often undertook a good deal of secular work, acting as benevolent and insurance societies, and sometimes providing roads, bridges, and schools. The *gilda mercatoria* became in many instances so important that some historians have asserted that the 'gild-merchant' formed practically the municipal gov., but this does not seem to be correct. Burgesses might or might not be gildsmen, and the gild did not govern the borough. But each controlled its own trade, having within its proper area a monopoly granted by charter. In time the craftsmen grew jealous of the traders and formed gilds of their own, master-craftsmen often belonging to both fraternities. As early as 1180, under Henry II., eighteen such gilds were fined for having been formed without special permission. Merchant gilds, especi-

ally in the larger cities, gradually found themselves supplanted by the new order, and by the end of the fourteenth century, the craft-gilds were victorious. They were as great monopolists as their predecessors, every 'misterie' being a close corporation, with very strict rules against competition, and also as to the hours of labour and the amount and quality of the work. These misteries held charters from the gov., and were assigned distinctive liveries; from them are descended the Livery Companies of to-day. Before long the craft-gilds themselves subdivided, the journeymen setting up companies of their own to contest the question of hours, wages, etc., with their masters, thus becoming the forerunners of modern trade-unions. The contest was much fiercer in Germany than in England, as the merchants there had organised themselves on very autocratic lines, and the struggle was not merely for improvement of labour conditions, but for general liberty. Most craft-gilds had religious associations, each having its own chapel and patron saint. In England these were abolished under Edward VI. See Smith's *English Gilds*; Gross, *The Guild Merchant*; Loftie's *London*; Ludwig Brentano, *Die Arbeitergilden der Gegenwart*, etc..

Guillaumat, Adolphe, Fr. general; b. Jan. 4 1863, at Bourgneuf. Pupil St. Cyr, 1882-84. Rose to colonel by 1900; in that year wounded in Boxer rebellion, Tientsin. Professor: St. Cyr, 1903; at school of war, 1906. Director of infantry, 1912. Brigadier-general, 1913. Commanded 33rd Div. 1914, Marne and Argonne; general 1st Army Corps, 1915, Verdun and Somme; 2nd Army, Verdun, freed position Aug. 20, 1917, Chief of allied armies of Orient, Salonika, 1917; Governor of Paris when beset, July 1918; commanded 5th Army on Aisne in Oct. Member Superior Council of War, 1919. Commander of Rhineland army from 1924.

Guillemots (*gull* and *mew*), a genus of diving birds of the auk family (Alcidae), and the genera *Cephus* and *Uria*. There are about eight species in the Arctic and N. temperate zones. The common or 'foolish' G. (*Uria troile*) breeds in Britain. The bill is long and straight, the wings and tail short, the feet three-toed and webbed, the legs being placed very far back. In colour G. are mostly brownish-black on top and white underneath. The dark throat becomes white or mottled in winter. They build no nests, but breed on rocky coasts. One pear-shaped egg is laid at a time. They are numerous round Flam-

borough Head (Yorkshire), the eggs being sought after chiefly for their albumen, which is used to clarify wine, and in the preparation of patent leather. The black G. (*Cep-*



GUILLEMOT

phus grylle) is less common but found in N. Scotland, and is smaller. A third British species (*U. Bruennichti*) is rare. See Howard Saunders, *Manual of British Birds*.

Guillim, John (c. 1565-1621), an English heraldic official, educated at Oxford. He was red cross herald-in-ordinary at the London College of Arms for most of his life. He was editor of *A Display of Heraldrie*, 1610 (reprinted 1724), from Dean Barkham's collections, according to Dugdale and Wood (seventeenth century). Ballard, Bliss, and Moule think it was chiefly G.'s own work. See Fuller's *Worthies*, 1662; Duncumb, *Herefordshire*; Wood's *Athenae Oxon.* (edited by Bliss, 1813-20), ii.; Moule's *Bibliotheca Heraldica: Notes and Queries* (2nd series), vi.-viii.

Guillotine, an instrument for inflicting capital punishment, introduced into France at the time of the Revolution. It consists of two upright posts surmounted by a cross-beam and grooved so as to guide an oblique-edged knife, the back of which is heavily weighted to make it fall swiftly and with force, when the cord by which it is held aloft is let go. Some say that the machine was invented by the Persians, and previous to the time when it became known by its present name, it was used in Scotland, England, and various parts of the Continent. In a museum in Edinburgh there is still preserved the 'Maiden,' as it is called. Until 1650 there existed in the forest of Hardwick, in England, a mode of trial and execution called the gibbet law, by which a felon convicted of theft, within the liberty, was sentenced to be decapitated by a machine called

the Halifax gibbet. In Germany the machine was in general use during the Middle Ages, under the name of the Diele, the Hobel, or the Dolabea. From the thirteenth century it was used in Italy, under the name of Mannaia, for the execution of criminals of noble birth. Dr. Guillotin, who first suggested its use in modern times, was b. at Saintes in 1738. In 1789 he brought forward two propositions regarding capital punishment, one being that it should be by means of a machine, and the other, that all, gentle and simple, who were sentenced, should be executed in the same way, as swiftly and painlessly as possible. The idea was adopted on Oct. 6, 1791. A Ger. named Schmidt furnished a machine for each of the départements in France. Experiments were first made with dead bodies from hospitals. A highwayman was the first to be thus executed; this was in 1792. Some doubt seems to have at first existed as to whether death was instantaneous, and the case of Charlotte Corday is instanced in support of the theory that it was not.

Guimarães, an anct. fortified tn. of Portugal, in the prov. of Minho. It is picturesquely situated on the R. Ave, and possesses hot sulphurous springs. Knives, leather, paper, etc., are manufactured, and table linen is woven. The tn. is famous for its embroidery. Pop. about 9000.

Guinea, a former gold current coin of Great Britain, first struck in Charles II.'s reign (1664), and so called because originally made from gold obtained from the Guinea Coast. 'Spade Gs.' were those which had a spade-shaped shield on the reverse with the royal arms. It was the chief English gold coin, till replaced by the sovereign in 1817. Its value varied considerably from 30s. in 1695 to 21s. in 1717—the value now understood by the word, though no current coin of the name still exists. Professional fees, subscriptions, prices of pictures, etc., are often estimated in Gs.

Guinea, a large section of the W. coast of Africa, generally considered to extend from the mouth of the Senegal to Cape Negro. The name came into general use in the fifteenth century. It is divided into two parts, Upper and Lower G., and comprises many states and political territories, viz. Senegal (a Fr. colony), the English settlements on the Gambia; Birrajos (Portuguese territory); Sierra Leone (British); the Ivory and Gold Coasts (Fr. and British); the Slave Coast (Fr. and British); the British Protectorate of Southern Nigeria, etc., etc. The coast-line is uniform and flat, interspersed with shallow lagoons. Inland the country

rises to the central plateau of Africa, and the rivers are usually precipitated in cataracts and rapids. The coast is hard of access from the sea, owing to the dearth of good havens and the roughness of the surface. The climate of G. is very unhealthy, if not deadly. The Portuguese were the first to explore and trade along the coast, tempted by the gold deposits, and later by the opportunities of slave-trading.

Guinea, Gulf of, a gulf of the Atlantic Ocean on the W. coast of Africa, between Capes Palmas and Lopez. On the N. and E. are two open bays—the Bights of Benin and of Biafra—separated by the delta of the Quorra or Niger. The gulf contains the islands of Fernando Po, Prince's (Príncipe) Is., St. Thomas (São Thomé), and Annobon. It receives the counter-equatorial current crossing the Atlantic near the equator, and sends out the equatorial current which flows in the opposite direction, finally giving rise to the Gulf Stream. For explorations there, see *Scot. Geog. Mag.*, 1888.

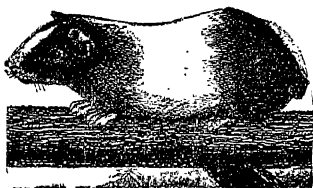
Guinea-fowl (*Numida*), a genus of African birds of the pheasant family (Phasianidae). There are about a dozen different species in the Ethiopian region, extending E. to Madagascar and S. to Natal. They are now naturalised and domesticated in most countries, but prefer a warm climate. Gs. are inclined to be quarrelsome in a poultry-yard, but are much valued for their flesh and eggs, which command high prices. The common pintado (*Numida meleagris*), sometimes called 'Come-back' from its frequent harsh cry (probably the *Meleagris* or *Gallina Numidica* of the Romans), has dark-grey plumage with round white spots, a horny 'casque' on the head, and fleshy wattles on the cheeks. Other species are the *Gullera cristata* of W. Africa, and the *Phasidius niger* of equatorial W. Africa (very rare). The males having spurs like pheasants. The birds are mostly gregarious and ground-feeders, but roost in trees. They were probably reintroduced to Europe by the Portuguese explorers of Africa in the sixteenth century. See Gosner, *Paralipomena*, 1555; Elliot, *Monograph of the Phasianidae*; Darwin, *Animals and Plants under Domestication*, 1875.

Guinea-grass, or *Panicum maximum*, a species of Gramineæ in the same genus as the millets. It is a perennial plant growing in a tropical climate, and is used as a fodder plant.

Guinea Pepper, or Bell Pepper, a name given to the seeds or dried fruit of several plants of W. Africa, such as the *Capsicum grossum*, *Capsicum fru-*

tescens, *Piper Clusii*, and *Xylopia Ethiopica*. Malaguetta (Malaghetta) pepper and Ethiopian pepper are often considered equivalent to G. P. It was much used as a vegetable and for pickling in the East (till replaced by Eastern peppers in the eighteenth century), and the trade in it resulted in the settlements of Grand Bassa and Cape Palmas. See CAPSICUM, CUBEBS.

Guinea-pig, or Cavy (*Cavia*), a genus of small rodents native to S. America, but now domesticated in most countries. Sometimes considered as a separate species (*Cavia cobaya*), the familiar common cavy is probably a domesticated form of the *Cavia aperea* of Guiana and Brazil, introduced by the Dutch into Europe



GUINEA-PIG

in the sixteenth century. The domesticated kinds are mostly white, or marked with yellow and black, or tawny-coloured. They have short limbs, the fore-feet having four toes, the hind feet only three. Their ears are short and rounded, and they have no tails. Gs. are very prolific, producing young five or six times a year. They are much used in bacteriological laboratories for the study of germ-diseases.

Guinea-worm, found in the tropics under the human skin, especially of the legs. The worms are the thickness of horse hairs, and measure from one or two to six feet in length. The eggs of the worm occur in water; they are swallowed by men, pass out of the stomach and migrate. The males die in the journey from the stomach to the skin. This is first raised into a pimple in which the female worm is found gradually working its way out. It is gently drawn out little by little for a week or so, for if the worm is broken severe inflammation is set up. The G. is said to be the 'fiery serpent' of Mosaic history.

Guinegate, a vil. of arron. Saint-Omer, dept. Pas-de-Calais, France. The site of two important battles: (1) In 1479, when the Austrians defeated the French; and (2) in 1513 (Aug. 16), when the English, under Henry VIII., and the Imperialists, under Maximilian I., put the French

to flight so precipitately that the battle was called the 'Battle of Spurs.'

Guines: (1) A city of Havana prov., Cuba, on R. Mayabeque, 34 m. S.E. of Havana. The town is flourishing, with many modern institutions, and stands in a fertile plain. Pop. about 13,500. (2) A tn. of arron. Boulogne. dept. Pas-de-Calais, France, 7 m. S. of Calais. Near this town, in 1520, Francis I. of France and Henry VIII. of England met on the 'Field of the Cloth of Gold.' Pop. 4289.

Guinevere, Guinever, or Guenever, a corrupt form of Guanhumara (Welsh *Gwenhwyfar*), an ancient British queen, daughter of King Leodograunce of Camelyard, and wife of King Arthur. She was the most beautiful of women and cherished a guilty love for Sir Launcelot of the Lake, one of the Knights of the Round Table. According to Geoffrey's *History of Britain*, during King Arthur's absence against Leo, King of Rome, she married his nephew Modred, who had usurped the kingdom left in his charge by Arthur. Arthur returned and defeated Modred at Cambula, a battle fatal to both leaders, while G. fled from York to the nunnery of Julius the Martyr at Newport in S. Wales. According to Malory, Arthur had gone to Brittany to punish Launcelot when Modred usurped the kingdom and attempted to marry G. She, however, shut herself up in the Tower of London, and on hearing of Arthur's death went into a nunnery at Almesbury. Tennyson, in the *Idylls of the King*, makes Modred discover the relationship between Guinevere and Launcelot. The latter flung Modred to the ground and took to horse, while the queen fled to Almesbury where Arthur came to take leave of her.

Guiney, Louise Imogen (1861-1920), American author, b. Jan 7, at Boston; daughter of Gen. Patrick Robt. G. Spent more than twelve years in England. Among her principal works are: *A Little English Gallery*, 1894; *Patrius*, 1897; *England and Yesterday*, 1898; *Happy Ending*, 1909; *The Martyr's Idyll*, 1899; and some literary monographs. Died at Chipping Campden, Glos., Nov. 2.

Guingamp, cap. of arron. in the dept. of Côtes-du-Nord, France, on the R. Trieux, 52 m. W. of St. Malo. From the fourteenth to the seventeenth century it was the capital of the duchy of Penthièvre. The mediæval church of Notre Dame de Bon Secours is a great resort of pilgrims. Pop. about 6000.

Guinicelli, Guido (c. 1230-76), an Italian poet, b. in Bologna, where he studied and practised law. In 124 he was exiled as one of the Ghibelline

Lambertazzi party, and died in exile. Only seven canzoni and five sonnets by him are extant, the best known being the canzone, *The Gentle Heart* (translated by G. D. Rossetti), which is praised by Dante. They are printed in a collection published at Florence by Nanucci in 1843.

Guinness: (1) *Arthur* (d. 1855), a brewer; head of the firm of Arthur Guinness & Sons, of Dublin. He married Anne, daughter of Benjamin Lee. (2) *Sir Benjamin Lee* (1798-1868), third son of the above, b. in Dublin and succeeded his father as head of the firm, which he managed with the greatest success. In 1851 he became first lord mayor of Dublin, and during 1860-5 restored St. Patrick's Cathedral at a cost of £150,000. In 1863 he was made an LL.D. of Dublin University; in 1865 was elected M.P. for the city in the Conservative interest, and in 1867 was created a baronet. (3) *Sir Arthur Edward* (b. 1840), eldest son of the above, succeeded to the baronetcy, and in 1880 was created Lord Ardilaun. (4) *Edward Cecil* (b. 1847), third son of Benjamin Lee, was created a baronet in 1885, Baron Iveagh in 1891, and Viscount Iveagh in 1905.

Guinobatan, a tn. and com. in Albay prov., Luzon, Philippine Is. It is situated on the R. Inaya, and hemp is extensively cultivated. Pop. 25,000.

Guipuzcoa, a maritime prov. of Northern Spain, situated on the Bay of Biscay, with an area of 728 sq. m. There are numerous mineral springs—salt, sulphurous and ferruginous—which are greatly frequented by visitors. The industries are carpets, glass, paper, chemicals, soap, cannon, etc. San Sebastian is the capital. Pop. 278,000.

Guiraud, Ernest (1837-92), a composer, b. at New Orleans, of French parentage; studied at Paris and Rome. He served in the Franco-German War (1870-1), and in 1876 became professor of harmony and accompaniment at the Conservatoire. His operas include: *Le roi David*, 1852; *Sylvie*, 1864; *En Prison*, 1869; *Le Kobold*, 1870; *Mme. Turlupin*, 1872; *Gretna Green*, 1873; *Piccolino*, 1876; *Le galante aventure*, 1882; *Gli avventurieri*, and *Brunhilde* (edited and produced posthumously). He also wrote several cantatas, overtures, masses, etc.

Guiraut de Borneil (c. 1138-c. 1220), a Provençal troubadour, b. at Excideuil (modern Dordogne), and accompanied Richard I. of England to the third crusade. About eighty love poems by him, written to a lady of Gascony, are extant, and are dis-

tinguished by simplicity and directness. He was known as 'Master of the troubadours,' and is mentioned in Dante's *Divina Commedia*. Some of his poems were edited by Kolsen in 1894, but no complete edition exists.

Guisborough, a market tn. of N. Riding, Yorkshire, England, situated in the valley of Cleveland, 9 m. E.S.E. of Middlesbrough. Iron is largely obtained in the neighbourhood, and there are breweries and tanneries. There is a sulphurous spring in the vicinity. Pop. 7104.

Guiscard (or Wiscard), **Robert** (1015-85), first Norman Duke of Apulia and Calabria, b. near Coutances, Normandy; the son of Tancred de Hauteville. He went to Italy as a pilgrim, and raised a band of adventurers to fight the Greeks and Calabrians. He was soon joined by many Normans and was very successful. In 1060 he captured Reggio and Cozenza, and accordingly obtained from Nicholas II. the investiture of Apulia and Calabria. He and his brother, Roger, were the papal champions in S. Italy and Sicily against the Greeks and Saracens. In 1081 he invaded the Byzantine empire and defeated the emperor, Alexius Comnenus, at Durazzo. He hurriedly returned to Italy to protect the pope, Gregory VIII., from the Emperor Henry IV., and later went back to the E., dying in Cephalonia.

Guise, a tn. of arron. Vervins, dept. Aisne, France, on the R. Oise, 16 m. N.E. of St. Quentin. It has important ironworks and manufactures textiles, and contains a communistic labour colony. It was fortified in the eleventh century and has stood many sieges. It gives its name to the duchy of G., founded 1528. Considerable damage was done to the town during the Great War. Pop. 6900.

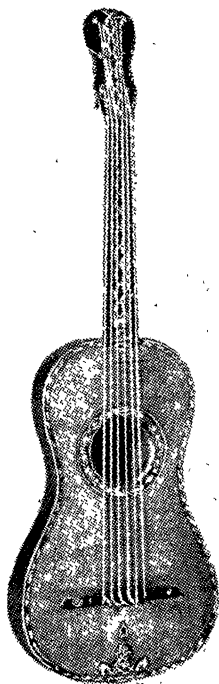
Guise (or Guyse), **Dukes of**, a ducal family of Lorraine, France, named from the town of Guise (q.v.). **Claude of Lorraine** (1496-1550), the first duke, b. at the Château of Condé, being the fifth son of René II., Duke of Lorraine. He became a French citizen; married Antoinette de Bourbon about 1514; joined the army and fought at Marignano (1515), and was created Duke of G. by Francis I. for suppressing the peasant revolt in Lorraine in 1527. **Francis of Lorraine** (1519-63), the second duke, was the son of Claude, and became a great military commander and leader of the Catholics. In 1552-3 he defended Metz against Charles V. of Germany; in 1554 fought at Hentli, and in 1556 commanded the expedition against Naples. In 1557 Henry II. made him lieutenant-general of the kingdom, and in 1558 he took Calais from the

English and brought about the treaty of Cateau-Cambrésis in 1559. He and his brother, Charles, Cardinal of Lorraine, were active in suppressing the Protestants, and defeated the conspiracy of Amboise, taking its leader, the Duke of Condé, captive at Dreux in 1562. He was assassinated by a Huguenot at the siege of Orleans. He left valuable memoirs. *Henry of Lorraine* (1550-88) (Balafre), the third duke, was the son of Francis, and succeeded him as an opponent of Protestantism. He fought at Poitiers, Jarnac, Moncontour (1569), and Dormans; was concerned in the massacre of St. Bartholomew (1572) and in the murder of Coligny. In 1576 he became head of the Catholic League. Becoming too ambitious, he was assassinated at Blois by the order of Henry III. *Charles IV. of Lorraine* (1571-1640), fourth duke, was imprisoned at Tours on the assassination of his father, Henry, in 1588. He escaped in 1591 and entered the service of Henry IV., gaining a victory at Marseilles in 1596. He was banished by Richelieu in 1631. *Henry II. of Lorraine* (1614-64), fifth duke and Prince of Joinville, b. at Blois, son of Charles IV. In 1629 he became Archbishop of Rheims and in 1640 succeeded to the dukedom. In 1641 he joined the conspiracy of the Count de Soissons against Richelieu and was condemned to death, but escaped to Flanders. In 1647 he joined the Neapolitan revolt of Masaniello against Spain, but was taken as a prisoner to Madrid. He escaped in 1652, again attempted to win Naples in 1654, and became High Chamberlain of France in 1655. The ducal line became extinct at the death of *Francis Joseph of Lorraine* (1670-75), the seventh duke.

Guiseley, a par. and vil. of W. Riding, Yorkshire, England, 2 m. S.W. of Otley. Tweeds and other woollen goods are manufactured. Numerous ancient stone coffins have been discovered. Pop. 5352.

Guitar (Sp. *guitarra*), a stringed musical instrument. It has a flat soundboard made of pine, with a large sound-hole; a flat back, made of maple, ash or cherry-wood, and joined to the soundboard by ribs and curving sides. There are six strings, three of gut and three of wire-covered silk, which extend from the bridge, which is of ebony, to the end of the finger-board, from which the head is bent back at an obtuse angle. The strings are tuned to the notes E, A, D, G, B, E in the treble clef, but they are produced an octave lower than written. The instrument is played by plucking at the strings with the thumb and three fingers of the right

hand, while the fingers of the left hand press the strings to regulate the intervals.



GUITAR

Guitry, Lucien-Germain (1860-1925), Fr. actor, b. Dec. 13, in Paris. First appearance, 1878. Married in London, 1882. Spent nine years in St. Petersburg. Returned to Paris, 1891. Acted at Odéon, Grand, and Porte-St.-Martin. In 1900, appeared as Coupeau in *L'Assommoir*. In 1902 and 1909 appeared in London theatres. Played the cock in Rostand's *Chantecler* (1910). Played in *Le Juif Polonais* and *L'Aiglon*, and represented Crainquebille in Anatole France's play. Died in Paris, June 1.

Guitry, Sacha, Fr. playwright and actor; b. Feb. 21, 1885, at St. Petersburg, where his father, Lucien G. (g.v.) was director of the Théâtre Michel. Educated at numerous schools and colleges—including Janson-de-Sully, Dominicains d'Arcueil,

Cordouelle's at Passy, Prax's at Batignolles, Aix-les-Bains, Chambéry, and the Institution Chevalier. His first known play, *Nono*, was produced in 1905. He has written about forty-five pieces; in all of which, except about half a dozen, he has acted—being, indeed, almost a necessary item in their interpretation. Two of those in which he does not appear are serious plays: *Jacqueline*, 1921; and *Un Sujet de Roman*, 1923—in this his father appeared.

Guittone of Arezzo (d. 1294), an Italian poet, b. in Tuscany; fought in the wars between Florence and Pisa, and in 1267 became a brother of the military order known as the Fratelli Gaudenti. He founded the Camaldolese monastery, Degli Angeli, at Florence, but died before it was completed. As a poet, he ranks high as one of the founders of Italian literature, being the first to give polish and regularity to the sonnet, while his prose style also had considerable influence for good. He is mentioned by Dante and Petrarch. His poems mostly appear in old collections of Italian poetry, such as *Antichi Poeti* (Venice), 1532. His prose writings and letters were published by Bottari at Rome in 1745.

Guiuan, a city of Samar Island belonging to the Philippine group. It is situated in the S. of the Archipelago. Pop. 12,000.

Guizot, François Pierre Guillaume (1787-1874), a French historian and statesman, b. at Nîmes, of Protestant family. His father died on a scaffold during the Revolution and the family fled to Geneva, where G. was educated. In 1805 he went to Paris to study law, but met with literary people who fired his aspirations, and seven years later he became modern history professor at the University of France. The same year saw the publication of his translation of Gibbon's *History*. In 1815 he became Secretary for the Interior and was promoted the following year to the State Council. During the next few years he led the 'Doctrinaire' party, but on the break-up of the Duc Decazes ministry (1821) he was stripped of office, and a year or two later was forbidden even to lecture. During this period he produced his *History of the English Revolution* (vols. i.-ii.), 1826-7; *History of Civilisation in Europe*, 1828; and the *History of Civilisation in France*, 1829-32; all of which have appeared in English translations. In 1830 he again took to public life as deputy for Lisieux (Normandy), and after the July Revolution became a cabinet minister, being finally promoted, when the cabinet was reorganised

(1832), to Minister of Education. In 1840, when his rival Thiers became Foreign Minister, G. came to London as ambassador and was very cordially received, but returned to Paris after a very brief sojourn. The next task which he attempted was the complete reconstruction of the French ministry and reorganisation of public administration, which occupied him until the 1848 Revolution. In 1847 he became Prime Minister, but at once involved himself in a disgraceful intrigue over the 'Spanish Marriages' question; he aimed at Palmerston's foreign policy in this, but succeeded only in causing bad feeling between England and France. The Revolution was largely due to his iron-handed firmness in carrying out his schemes; after this he took no further part in political life, but retired to his home at Lisieux and concentrated on literary work. The first eight years of his retirement were occupied in the completion of his *History of the English Revolution* (vols. iii.-viii.), 1850-56; his *Mémoires* appeared in nine volumes (1858-68), and his daughter, Madame de Witt, published his *Child's History of France* (5 vols.), 1870-75; his only remaining work of importance is the remarkable biography of Washington (1840). G. is considered to be the founder of historical science, as opposed to the old style of chronicle pure and simple. His writings leave much to be desired in point of form and style, but are highly suggestive, well reasoned, and full of valuable ideas.

Gujerat, Guzerat or Gujrat: (1) A northern maritime prov. of Bombay presidency, British India. It includes the peninsula of Kathiawar, and a large district along the Rann of Cutch and the Gulf of Cambay. The political division of G., under direct British rule, is included in it, as are also several feudatory states, such as Baroda. The district contains parts of the Western Ghats and the Vindhya and Satpura Mountains, and is watered by the Tapti, Nerbudda, Mahi, and Sabermutti rivers. The soil is fertile, but the climate unhealthy. Area 70,038 sq. m. Pop. over 9,000,000, mainly Hindoos in religion. (2) A tn. of the district of the same name in the Punjab, Brit. India, bordering on Kashmir, 72 m. N.W. of Lahore. Has important industries of brass vessels, footwear, inlaid articles, and textiles. Pop. (1921) 21,974.

Gujranwala, a dist. and tn. of the Punjab, British India. The tn. is situated on the Grand Trunk Road and Northern State Railway, 40 m. N. of Lahore. There are manufs. of

silk scarves, jewellery, and brass goods. Pop. about 37,000.

Gulek-Boghaz, or **The Cilician Gates**, a pass in the S.E. of Asiatic Turkey. From earliest times the main road from all parts of the plateau has been through here.

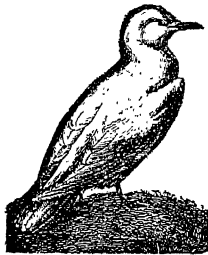
Gulf: (1) A tract of the sea extending into the land, similar to, but larger than, a bay. (2) A term applied at Cambridge to that section of an examination list coming between the creditable passes and the complete failures.

Gulfport, the port for the Pearl river customs dist., situated in Mississippi, U.S.A., 13 m. from Biloxi. The dredging of a channel between G. and Ship Island (finished in 1906) gave a great impetus to the trade of the former. It has saw mills, canning factories, and railroad shops. Lumber, rosin and turpentine are shipped from this port. It is a summer and winter resort, and has military academies and a college for girls. Pop. 12,547.

Gulf Stream. An ocean current in the North Atlantic. It issues from the Gulf of Mexico, which gives it its name, being formed from the warm waters of the equatorial current, and flows out northward through the Gulf of Florida and along the E. coast of N. America, from which it is separated by the 'Cold Wall,' a narrow strip of cold water. It is early joined by another current coming from outside the W. Indies. When leaving the gulf, the G. S. is from 50 to 100 m. wide, and 2000 ft. deep, and moves with an average velocity of 80 m. a day. Its temperature is then about 80° F., but as it flows northwards, the temperature drops, and the current becomes broader and less rapid. At a point off Newfoundland it merges into the 'G. S. Drift,' which flows eastward across the Atlantic, and later divides into two branches, which flow N. and S. respectively.

Gull (Welsh *gwyllan*), the name applied to a group of sea-birds, members of the division *Larinae* of the family *Laridae*. Under the most recent classification forty-nine species of gulls are admitted and these are placed in five genera: *Pagophila* (the Ivory gull), and *Rhodostethia* (which has a small bill and wedge-shaped tail), in each of which there is only one species, *Rissa* (in which the hind toe is wanting), and *Xema* (the members of which have forked tails), each containing two species, and *Larus* (with square tails), in which are a large number of varying species. Among the most common are the black-headed gull (*L. ridibundus*), which frequents marshy coasts; the herring gull (*L. argentatus*), a large

and handsome variety; the common gull (*L. canus*); the lesser black-backed gull (*L. fuscus*); the greater black-backed gull (*L. marinus*), which is one of the largest species;



LARUS EBURNEUS

The Ivory-gull—a beautiful pure-white species

and the glaucous gull (*L. glaucus*), which is circumpolar in its distribution. The smallest species are the *L. minutus*, and the *L. philadelphia*.

Gull, Sir William Withy (1816-90), a physician, b. in Essex; educated at Guy's Hospital, London; graduated as M.B. in 1841 and M.D. in 1846. From 1847 to 1849 he was Fullerian professor of physiology at the Royal Institution of Great Britain; and from 1856 to 1865 a physician and lecturer at Guy's Hospital. He was elected a fellow of the Royal College of Physicians in 1848, and in 1871 attended the Prince of Wales during his attack of fever. For his services in this respect he was made a baronet and appointed physician to the queen in 1872. His numerous works, which have been edited by Dr. Acland, include: *Gullstonian Lectures on Paralysis*; *Report on Cholera*; *Hypochondriasis*; *Abscesses of the Brain*.

Gullet, or **Œsophagus**, a tube lined with mucous membrane which is separated by cellular tissue from its muscular foundation. The muscular fibres are striped in the upper portion and unstriped in the lower. The mucous membrane is thrown into a number of longitudinal pleats to allow of stretching. Compound racemose glands secrete a viscid mucus, and occur throughout the whole length of the G., though they are most numerous at the bottom. In man the tube is 9 to 10 in. in length, and from $\frac{1}{4}$ to 1 in. in diameter, and extends from the lower part of the pharynx, passes along the front of the spine, and terminates with about 1 in. of it

in the abdomen at the cardiac end of the stomach. Among certain mammalia, *e.g.* ruminants, a layer of voluntary muscle in the G. allows of antiperistaltic movements being induced by which food can be regurgitated into the mouth.

Gully, William Court, Viscount Selby (1835-1909), an English statesman, *b.* in London; educated at Cambridge; in 1860 was called to the Bar at the Inner Temple. After contesting two unsuccessful elections, in 1880 and 1885, he was elected as Liberal M.P. for Carlisle in 1892. In 1895, on the resignation of Mr. Speaker Peel, he became Speaker of the House of Commons. He filled this difficult post with impartiality, dignity, and courtesy, and the only unfortunate incident of his career was the forcible removal of several Irish members who refused to leave their seats after a division had been called in March 1901. This lost him the confidence of the Irish party. He resigned office in 1905, and was created Viscount Selby on his retirement.

Gum. Gs. are the solidified exudations of different parts of plants (branches, stems, fruits, etc.), or are contained in the plant juices themselves. They belong to the carbohydrate group, are odourless, tasteless, amorphous substances which on treatment with water form either clear solutions or gelatinous liquids. The following are the principal kinds met with commercially: *Gum arabic*, obtained from various species of *Acacia*, sometimes known as *G. acacia*, is probably a calcium potassium salt of gummic acid (first prepared by dialysis by Graham). The G. occurs in rounded lumps which in some cases are almost transparent, while in others opaque owing to the large number of minute cracks. When treated with water it swells up and eventually dissolves, giving a solution with marked adhesive properties. On treatment with dilute sulphuric acid it gives galactose, and on oxidation a mixture of mucic and saccharic acids together with oxalic and tartaric acids. It is used in the 'dressing' or finishing of fabrics such as silks and calicoes, and, when mixed with glycerine, for making 'gummed' labels. *Gum senegal* is closely allied to *G. arabic*, and is often used to adulterate the latter. It is derived from *Acacia Vereke*. *Gum tragacanth*, sometimes known as *G. dragon*, is obtained from different species of *Astragalus* which flourish in Persia, Syria, and Kurdistan. *G. tragacanth* forms curious horny translucent masses which swell slowly when treated with water, yielding a thick

mucilage of low adhesive power. It is mainly used in the dressing of fabrics and in calico-printing, but is also employed in the manufacture of metallic-filament lamps for electric lighting. *G. tragacanth* probably belongs to the bassorin group of Gs. The Gs. exuding from cherry, plum, and apricot trees form a group apart. On hydrolysis they yield arabinose, and on oxidation oxalic acid. Under



ACACIA VERA

(Gum arabic Tree, N. Africa)

the term G. resins are included the juices of certain plants which are mixtures of Gs. and resins. On treatment with water, partial solution of the G. takes place and the resin is held in suspension. The best-known specimens of this class are: *G. ammoniacum*, *G. euphorbium*, *G. galbanum*, gamboge, and myrrh. Possibly caoutchouc and gutta-percha might find place in this group.

Gumal Pass, or **Gomal**, a mountain pass of Afghanistan and the chief on the Indian frontier, between the Khyber and the Bolan. It forms a connection between Dera Ismail Khan and the Gomal valley.

Gumbinnen, a gov. dist. and tn. of E. Prussia, Germany. The town is situated on the Pissa, 72 m. E. of Königsberg; it is a flourishing industrial centre. The manufactures are machinery, beer, brandy, and hosiery; the weaving of woollen, cotton, and linen is also carried on. The first important engagement between the Germans and Russians in the Great War took place here on Aug. 19, 20, 1914. Pop. 17,400.

Gummersbach, a tn. of Prussia, Germany, situated in the Lower Rhine prov., 24 m. E. of Cologne. There are manufactures of woollen and cotton goods. Pop. about 16,000.

Gumming, a contagious disease which commonly attacks the vine and the plum, cherry, pear, peach, and other trees. It is due to the ravages of a fungus, *Coryneum beijerinckii*, which converts the cells of the host into gum. It is best to destroy the diseased tree, but the treatment consists in frequent washings. Excess of manure is often the cause.

Gumti, a river of the United Provinces and Oudh, India, rising 520 ft. above sea-level. Its course is generally S.E. for 365 m., until it enters the Ganges, 25 m. from Benares.

Gümürjina, a tn. situated in Adrianople, W. Thrace, on the R. Karaga. Wheat, barley, maize, etc., are grown, copper and antimony are mined, and there is a trade in wine and silk. Pop. about 21,900.

Gun, the name applied generally to a weapon from which is discharged by means of an explosive a projectile. The word is, nowadays, applied almost exclusively to cannon and to the weapons used for sport. The military weapons, such as a musket or a rifle, are in technical language called small arms. Originally the G. was employed for purely military purposes; it was not until very much later that the weapon began to be generally used for sport. The origin of the name G. does not seem to be generally known. The generally accepted derivation, however, is that it is an abbreviation of the Gunhilda. This derivation has received the support of Professor W. W. Skeat and is given also by the *New English Dictionary*. Other dictionaries give the derivation as from the Old Fr. word *mangonne*. The name is applied really only to the tubular weapon together with its stock as used for hand firing. The hand G. was in fairly general use by the middle of the fifteenth century, but at this time was of very rude construction. It consisted simply of a tube of brass or iron which had a touch hole at the top and a straight stock which was placed

under the armpit when the weapon was to be fired. The soldiers carried long matches made of cotton soaked in a strong solution of saltpetre. Horse soldiers also carried this type of G., which was suspended by a cord over their shoulders and which when about to be fired was placed on a forked rest which when not in use hung down beside them. During the early Tudor period an improvement in the shape of a matchlock G. was invented. This has a cock at the side of the G. which held the match, and by means of a trigger the match was brought into contact with the gunpowder. Almost at the same time we find a number of improvements in the weapon used, the stock of the G. being made bent, and also provided with a broad butt end which could be more or less comfortably placed against the right breast. This was generally termed an arquebus and was a lighter weapon than the later musket, since it did not need a rest and could be more easily carried. A smaller weapon was at the same time used, constructed on much the same principle, but which may be regarded as the forerunner of the later pistol. The next improvement in G.-making was the invention of the wheel lock, a weapon which carried a wheel at the side of the priming pan. This wheel was wound tightly up and could only be released by the trigger. When the trigger was pulled the wheel revolved, and by means of its rapid action on a piece of iron pyrites on which it rested gave forth a number of sparks which ignited the powder. This weapon, however, did not come into general use, since its mechanism was somewhat involved, and therefore naturally expensive. At the same time it was liable to get out of order in a very short space of time, and hence it is not at all to be wondered at that it was not generally used. Nevertheless, it remained in use until the reign of Charles II. About the middle of the sixteenth century the musket was invented by the Spaniards. This weapon was much heavier than the Gs. previously used and carried a much heavier shot. It necessitated the use of a forked rest, but proved of such great value that it was generally adopted throughout Europe. It was made on the matchlock principle, and it carried a ball of about 1½ oz. During this period the snap-hance was invented in Germany. During the early part of the seventeenth century the firelock or flintlock was produced. This was a great improvement on previous weapons, since it did away with the necessity for filling the priming pan, either from a flask of powder which was

carried for that purpose or by biting off the top of the cartridge as was the later practice. This weapon when at first invented was of little use, but gradually, during the seventeenth century, it was improved upon and began to be generally used in the European armies. From William III.'s time, for example, the raising of regiments of fusiliers dates. These were regiments which carried a fusil or musket made on the principle of the firelock or flintlock. This weapon was of the type of the famous Brown Bess used during the War of the Spanish Succession by the troops under the command of Marlborough. During the eighteenth century continual improvements went on, and this weapon continued in general use until the middle of the nineteenth century. This type of weapon, however, did not fulfil all its functions equally well, and whereas it increased the rapidity of artillery fire, nevertheless, at the same time, it was always liable to misfire, since the priming could not always be guarded from the wet. To obviate this difficulty, early in the nineteenth century percussion caps were invented, but were not used in the army until some considerable time later. By the end of William IV.'s reign, however, we find them in fairly general use, and after a prolonged trial by the army authorities they were adopted for use in the army. In 1842 the last improvement took place in the weapons of the Brown Bess type, but these were within ten years replaced by the use of rifles in the British army. Rifles did not at first altogether replace the percussion musket, but with the improvement of the rifle the use of muskets was abandoned altogether (1855). The rifle was a form of musket in which by means of grooves in the bore the bullet was made to rotate before leaving the barrel. The effect of this rotation is to ensure a more accurate flight of the projectile. The grooves in the bore were usually spiral in form, although some seem to have been made with straight grooves. The great difficulty which had to be overcome was the manner in which the bullet was to be introduced into the rifle. The principle of rifling was discovered early in the sixteenth century, but does not seem to have been generally used except for purposes of amusement. We do, however, come across occasional examples of its use, and by the end of the eighteenth century the idea of its general use had been adopted. Some rifle regiments were formed both in France and in England, but the difficulty of loading, and the waste of time which it entailed, prevented the general

adoption of this method of warfare. Various experiments were tried, but they all either allowed too much windage, or else, owing to the means adopted to force them into their place, were erratic in flight. The difficulty, however, was gradually being overcome, and by 1835 a regiment of riflemen had been raised and armed with rifles made on the percussion principle. This, in fact, was the first recognition by the army authorities of Forsyth's invention of the percussion cap. In 1835 Greener produced an expansive bullet which was rejected by the army authorities on the ground that it was a compound bullet. It had, however, shown the advantage of rifle fire over musket fire, and had also shown that the difficulty of windage and the erratic flight of the bullet could be overcome. In 1851 the Minie bullet was adopted by the British military authorities, and this Minie rifle was used during the Crimean War. In 1855 the Enfield rifle was invented, and was adopted by the authorities, being used in the later stages of the Crimean War and taking the place of the Minie rifle. The Enfield rifle was in general use until the adoption of the breech loader in 1867. During the American Civil War, breech loading Gs. were used by the Federal cavalry, and in 1867 Snider's method of converting the muzzle loading Enfield into a breech loader was adopted by the military authorities of Great Britain. The adoption of the breech loading rifle became at this time fairly general throughout Europe, although the types of rifle adopted were by no means the same. The celebrated needle G. of the Prussians, which caused such a sensation and was of such great value during the short Austrian War, had been adopted some time previously; in fact, the Russians were the first to appreciate thoroughly the value of a breech loading bolt action weapon. In 1871 the breech loading Martini-Henry rifle was adopted by the British military authorities. The calibre of this rifle was .433 in., and it had bolt action. The authorities of Europe about this time generally adopted rifles of similar pattern. Various improvements were continually being made until a great step forward was made by the invention of a magazine G. Russia was again to the fore in the adoption of this new invention, and in 1884 it adapted the Mauser rifle to the magazine rifle. Not unnaturally France followed suit, but adopted a rifle of different pattern. In the meantime, after a series of experiments, and exhaustive commissions the British War Office adopted a new

rifle in the shape of the Lee-Metford Mark I. rifle in 1888. In 1891 the Lee-Metford Mark II. was adopted, this being a six cartridge magazine carbine with bolt action and firing smokeless powder, which had come into general use in 1890. This rifle was subsequently still further improved, and became known as the Lee-Enfield rifle. Cordite was introduced as a smokeless explosive adapted to both the Lee-Metford and Lee-Enfield types of rifle, both of which took cartridges made from cordite. Both these rifles also were small bore magazine rifles, the whole length of whose barrel was protected by a wooden handgrip. The length of the barrel was 21 in. In 1900 Great Britain had adopted a rifle of the bolt action type, but had rejected the multiple loader by means of a charger. This adopted weapon was given up in 1903 when the short rifle came into prominence. Up to 1903 the principle adopted by the musketry regulations had been to use the rifle as a single loader whenever possible and to reserve magazine fire for special emergencies. By the adoption of a similar rifle in 1903, as already mentioned, this principle was given up and the principle of magazine fire was adopted in the British army. The most serious difficulty to be overcome as far as the short rifle was concerned was the loss of five inches when the bayonet was used. In 1908 this was made up for by the adoption of a bayonet five inches longer than the previous one. The long Lee-Metford and Lee-Enfield rifles were fitted out with a charge-loading apparatus and issued to the infantry of the Territorial Force. One of the chief reasons which had been urged for the adoption of the short rifle was the fact that when the cavalry was armed with this weapon they could compete on more equal terms with the infantry when they were fighting dismounted. The chief objection to the experimental weapons put forward before the Great War was that they were too heavy for the infantry to carry; and approximated too closely to the machine G. The massed formations in attack used by the Gers. in the Great War needed an automatic G. to resist them; otherwise they would have overwhelmed their opponents before suffering any appreciable number of casualties. Consequently the number of machine Gs. of the Allies rapidly increased. Early in the war the Lewis light automatic G. was invented and used extensively, and it is still in use, being the principal weapon of half the infantry in the British army. It is not regarded as a 'specialist' weapon, and instruc-

tion in its use is a normal part of training. The G. is air-cooled, is fed by circular pan-shaped magazines each holding 47 rounds of .303 S.A.A. The weapon is shoulder-controlled, can produce a large volume of highly-concentrated fire, has many delicate parts and therefore requires careful handling. Its rate of fire is between 600 and 700 rounds per minute, best delivered in short bursts of four or five rounds at intervals.

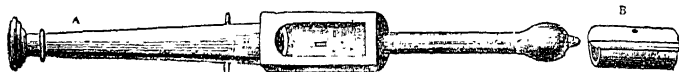
At the time the Great War broke out Great Britain was experimenting with a new pattern rifle which had a calibre of .276. Instead of the ordinary backsight it had a light aperture sight. On the whole it was satisfactory, but was not issued for general use. As a result of the Great War experience a new Mark VI. S.M.L.E. rifle has been approved. This has an aperture sight, and has a much stronger body and barrel than its predecessor. As a result of experience, opinion has grown in favour of a streamline bullet, but this requires deeper loading, thereby reducing the space allocated to the charge, and great care is required in ensuring exact concentricity as this governs the flight. (See also ARMS: BULLET; and, for further information on sporting Gs., see also RIFLE.)

Cannon.—An old name for Gs. as used by the artillery and as contradistinguished from hand Gs. The name is derived from the Latin 'canna—a hollow reed.' It is difficult to establish when cannon were first used in Europe, but they were first used in Great Britain by Edward III. in his campaign against the Scots in 1327. They were then called 'crakys of war.' The Fr. appear to have first used them in 1338. Originally cannon were somewhat in the nature of mortars, constructed by welding together iron bars, strengthened by iron hoops. They were sometimes constructed as 'twins' or 'triplets,' that is, two or three cannon were fastened together permanently. A good specimen of this type of early cannon is 'Mons Meg,' now in the Tower of London. The earliest patterns were loaded and fired at the muzzle, but breech loading and firing was not long in developing. A form of cannon was the bombard—from the Gk. 'bombos—the noise made when it was fired.' These were made of hammered iron originally, but later on they were cast from a composition called 'gun metal.' A G. of this pattern was found on the coast of Ireland, and is supposed to have been used by the Spanish Armada. Gradually the term 'cannon' was used to describe all sorts of missile-throwing machines, small as

well as large. It was the custom in the Middle Ages to give these weapons personal names, such as the Devil, the Twelve Apostles (for a battery of twelve), a survival of which is seen in Queen Elizabeth's Pocket Pistol at Dover. Many types of cannon were named after serpents. The name 'culverin' remained until a very late date. The mounting of cannon was very crude in the early days: they were simply laid on pieces of timber to which they were fastened. For mobility wheels were fixed to the timber. Elevation was obtained by fixing to the front portion of the timber, called the carriage, an arrangement similar to that used for high-jumping, *i.e.* a vertical stand pierced with holes so that the cross-bar could be raised or lowered. Another method was to fix the cannon

of about 180 tons, 75 ft. long, with a speed of about $6\frac{1}{2}$ knots. Various improvements were made on this type of boat, until at the present time we have specially constructed Gs., which are used to a very great extent for river service and which have a displacement tonnage of about 700 tons. The average speed is just over 12 knots an hour, and they carry two 4-in. quick-firing guns, four 12-pounders, and ten machineguns. The boat is steel built and copper sheathed, and about $2\frac{1}{2}$ times as long as the earliest type of G. Boats of this type are used a great deal on the R. Nile.

Gun-carriage, the support of a very large piece of ordnance. It is built in order to be able to stand very heavy strains. It has to withstand the shock caused by firing the piece, and it has



A. ANCIENT CANNON RAISED FROM THE GOODWIN SANDS, AND SUPPOSED, FROM A COAT OF ARMS, TO HAVE BEEN MADE ABOUT THE YEAR 1730.
B. CHAMBER FOR LOADING

to gimbals which swivelled round in any direction from a bench. These Gs. were controlled by hand and were loaded at the breech. In the seventeenth century red-hot shot was fired from cannon, the idea having occurred to a Ger. Improvements in the construction of cannon were noticeable in the sixteenth century in Switzerland, where the casting of a whole cannon was experimented with, the bore being 'bored out' from the solid. The Flemings were considered the masters in everything pertaining to cannon in the fourteenth and fifteenth centuries, and many of the chief positions in the artillery of England were held by them. They were also the writers of all the authoritative manuals on the construction and employment of cannon. The numerous wars in Europe during the seventeenth and eighteenth centuries gave ample scope for the employment of cannon, and improvements were constantly being made, until a light cannon or G., with fairly good accuracy, was evolved which was eventually displaced by the modern field-G. (*See also ARTILLERY; HOWITZER.*)

Gunboat, the main principle which underlies the construction of a boat of this type is that she shall to all intents and purposes be simply a floating gun-carriage. The earliest type of G., constructed about the middle of the nineteenth century, was

also to be of great stability in order to be able to stand the strain of being drawn at a rapid pace over broken or rocky ground. There is a special department in the arsenal at Woolwich which attends to the manufacture of Gs. This department is of special importance since the G. must of a necessity be neither too heavy nor too lumbering to be easily moved.

Gun-cotton, regarded usually as a nitrate of cellulose, is probably a mixture of nitrates. It is produced, briefly, by the action of strong nitric acid on cellulose. Early in the nineteenth century the action of concentrated nitric acid on fibrous or woody bodies was noted, and finally Pelouze made the discovery that cotton when treated with concentrated nitric acid became a highly explosive body. Following on these experiments Schönbein commenced his discovery of G. proper, *i.e.* cotton which had been treated with nitric acid and which had then become an exceedingly explosive substance. The modern method of manufacture is based essentially upon the method discovered by Schönbein. Cotton waste which has been carefully cleaned and dried is treated with a mixture of concentrated sulphuric and nitric acid. The sulphuric acid is used in quantities in excess of the nitric, and its chief use is to absorb the water produced during the process

and to keep the nitric acid constantly concentrated. The process takes place at the ordinary temperature and lasts for from three to four hours. The product is then carefully washed and cleaned, since there is always present a certain amount of cellulose which has not been treated, and certain impurities in the cellulose give rise to the formation of sulphates; these sulphates are one of the causes of the not infrequent instability of the G. The G. is now pulped and either compressed into blocks, or dried in its ordinary state. It still retains the appearance of ordinary cotton waste, and does not explode save under confined conditions. The chemical formula is $C_6H_7O_2(O\cdot NO_2)_3$. Mixed with nitroglycerin (*q.v.*), it forms the useful propellant explosive *cordite*.

Gundagai, a tn. of New S. Wales, Australia, situated in Clarendon co., 95 m. N.E. of Albury, in the vicinity of the goldfields. Pop. 1600.

Gungl, Josef (1810-89), a Hungarian composer and conductor, b. at Zsámbék; was a bandmaster in the Austrian army (1835-43); in 1843 established an orchestra, with which he toured in Europe and America. He became director of music to the King of Prussia in 1849, and to the Emperor of Austria in 1858. He composed numerous popular dances, marked by easy and rhythmical melody, of which the "Amoretten" waltz is perhaps the most popular.

Gunib, a fortified tn. of Daghestan, Caucasus, 75 m. N.W. of Derbent. It stands at an alt. of 4020 ft. close to Gunib Peak (7718 ft.) and was the last refuge of Shamil, the Circassian chief who surrendered to Russia in 1859. Pop. 1000.

Gun-metal, an alloy consisting of about 9 parts copper, 1 part tin, together with small quantities of lead and zinc. It is a tough reddish metal, much used for making castings for bearings and other engineering purposes, and formerly used for making ordnance. It requires careful casting as the constituents are somewhat liable to separate in the process.

Gunnery, the science which governs the employment of firearms. The science is itself very detailed, since a knowledge of it requires a knowledge of the metals from which the guns are made, the method of their manufacture, and an ability to calculate the strain to which proper use will subject the weapon. Again, the science must calculate the probable effect of the missile upon the object fired at, the velocity of the projectile when fired, and the effect of the forces which will be brought to bear upon the

missile both before and after it leaves the gun. The subject has been frequently treated in books published from time to time, the earliest being published fairly early in the sixteenth century. But literature on the subject increased enormously during the nineteenth century and is increasing almost every day. The science is to-day far more exact than it has ever been, and the calculations which are made in gun testing and gun making are abstruse in the extreme. Calculating tables and instruments have been produced, and have reached such a pitch that it is possible nowadays to calculate before a shot is fired the range of a gun, where elevations and calibre are known, and usually such calculations are well within the mark. The intricate calculations and the delicate mechanism, both of the modern gun and of the modern instruments, are such that G. may now be regarded as an exact science. See *Tartaglia, Nova Scientia*, 1537; Galileo, 1638; *The Official Textbook of Gunnery; Ordnance and Gunnery*. See also ARTILLERY.

Naval Gunnery.—Admiral Sir Percy Scott, a great expert on naval G., lays particular stress on 'director' firing (consult his *Fifty Years in the Royal Navy*). Prior to the Great War, the regular publication of the annual returns of the Gunlayers' Test gave Scott a conspicuous position in the public eye, and there has been controversy over the alleged neglect by the authorities to adopt his inventions. The opposed or anti-Fisher school of thought suggests that the problem of naval fighting, in the days preceding the war, was never contemplated, as a whole; but it is to be borne in mind that 'director' firing, to which this school attaches such great importance, would not by itself have achieved for naval G. all that a naval action demanded. There are other and infinitely more important elements to be taken into account; for, in default of some device for knowing and keeping the range in the conditions in which a ship should fight, the 'director,' so far from giving increased efficiency, might lead to worse results than individual laying. This fact would seem to have been clearly proved by the Gers., whose naval guns were far more accurate than the British. It is true that a study of the actions of the Dogger Bank and of the Rufiji River reveal that the Ger. broadsides fell persistently short or just over the target for hours without making one hit; but this result is exactly what might be expected of a broadside which was fired, not only as a single

gun, but in which each gun, of necessity, behaved exactly like every other gun. With less mechanical uniformity of firing, the broadside would, on the law of averages, have occasionally straddled the target or hit it; and failure was due to the fact that, while the aiming and gun were good, the arrangements for finding and keeping the range were defective. Again, the Battle of Jutland affords no proof that the 'director' by itself guarantees efficiency; and it is significant that only one Ger. ship (*Blücher*) was sunk by gun-fire. Lord Jellicoe, indeed, tells us that his range finders were not equal to the conditions of light or visibility, and that he dared not manœuvre his fleet under large helm; for to do so would have meant putting his artillery out of action.

Gunnigfeld, a com. and small tn. of Prussia in Westphalia, situated in the gov. of Arnsberg. Pop. about 10,000.

Gunning, Elizabeth, Duchess of Hamilton and of Argyll (1734-90), a celebrated beauty, daughter of John G. of Castle Coote, Co. Roscommon, Ireland. In 1751, she and her sister Maria (*q.v.*) went to London and attracted great attention as 'the handsomest women alive.' In 1752 Elizabeth married James, sixth Duke of Hamilton, and in 1759 John Campbell, Marquis of Lorne, who was afterwards fifth Duke of Argyll. She and her sister were frequently painted, and numerous engravings of the portraits exist.

Gunning, Maria, Countess of Coventry (1733-60), a celebrated beauty, said to have been more handsome than her sister Elizabeth (*q.v.*). She was once mobbed by a crowd in Hyde Park, and the king accordingly gave her a guard. In 1752 she married George William, sixth Earl of Coventry.

Gunnison, a riv. of Colorado, U.S.A. Its source is in the N. of Saguache co., and its course is W. and N.W., until it enters the Grand R. at Grand Junction, about 25 m. E. of the W. borders of Colorado. There are numerous cañons.

Gunpowder, an explosive composed of charcoal, sulphur, and saltpetre. This substance has had an enormous influence on the history of the world; it revolutionised the art of war, and has not been without its effect on the arts of peace. It is, perhaps, scarcely possible to speak about the discovery of G., since if it was discovered, we have no definite proof of the fact, and what facts we have at our command seem rather to prove that it was but the development which went on for some considerable time. The names, however, of Friar

Roger Bacon and the Ger., Schwartz have usually been associated with its discovery. Schwartz is supposed by the greater number of authorities to be the inventor of G., but we have proof that G. and cannon existed previous to the date when Schwartz is *supposed* to have invented it. Bacon himself does not appear to have been aware of many of the properties of G., although he certainly was the first person in England to make it. He, however, regarded it to a very great extent as an explosive which was to be used for purposes of diversion, although he was aware of its explosive properties, and probably realised that it could be used for blowing people up. Many references to the existence and use of cannon and G. are found between the years 1327 and 1340. Edward III. is supposed to have used cannon against the Scots in the early wars of his reign, whilst we find another reference to the existence of G. in England in 1338. In Richard II.'s reign it was in fairly common use, and Henry V. ordered that G. should not be taken out of the country without licence. Henry V. used it before Harfleur, but it did not become really effective until the end of the fifteenth century.

Gunpowder Plot, a conspiracy to blow up the Houses of Parliament and the king (James I.), who was to be present to open parliament on Nov. 5, 1605. It was contrived by a number of Rom. Catholics, with Robert Catesby at their head, and seems to have been brought to a head by the revival, in 1604 and 1605, of measures of repression against the Rom. faith in England. It is known that Catesby was conceiving a plan in May 1603, and in Jan. 1604 some details were arranged between himself, Robert Winter, and John Wright. They were later joined by Guy Fawkes, brought by Winter from Spain, Thomas Percy, Thomas Winter, John Grant, Ambrose Rokewood, Robert Keyes, Sir Everard Digby, Francis Tresham, and Thomas Bates, a servant of Catesby's, while two Jesuit priests, Greenway and Garnet, were also involved. In May 1604 the conspirators hired a house adjoining the House of Lords, and in Dec. began to work a mine from the cellar. In March 1605 they obtained possession of a vault under the House of Lords, and stored in it thirty-six barrels of gunpowder. In May they separated to make arrangements for the carrying out of the plot subsequent to the explosion. The plot was discovered through an anonymous letter, for which Tresham was probably responsible, sent to Lord Mont-

eagle on Oct. 26. On Nov. 4 a thorough search was made, and Guy Fawkes was arrested at his post in the cellar. The efforts of Catesby to bring about the arranged rising were fruitless.

Güns (Hungarian *Kőszeg*), a tn. of Hungary, in the co. of Vas, situated on the Gyöngyös. It has an extensive wine and fruit trade, and there are manufs. of earthenware and cloth. There is a noted castle. Pop. about 8500.

Gunst, Pieter van (1667-1724), a Dutch portrait engraver, b. at Amsterdam. His work is neat and careful, but sometimes weak in drawing. Among his best engravings are those of A. Houbraken's drawings from Vandyck; of Brandon's 'William III. and Queen Mary'; of Holbein's 'Erasmus'; of Van der Werf's 'Duke of Marlborough'; of Kneller's 'Queen Anne'; of Riley's 'Dryden'; and of Greenhill's 'Locke.'

Gunter, Archibald Clavering (1847-1907), an American novelist and dramatist, b. in England, but went as a child to California, where he studied in the School of Mines. After working as an engineer, a chemist, and a stockbroker, he took up literature and became the proprietor of the Home Publishing Company. His best plays are *Prince Carl* and *Mr. Barnes of New York*; and among his novels are *Mr. Barnes of New York*, 1887; *Mr. Potter of Texas*, 1888; *That Frenchman*, 1889; *Jack Curzon*, 1899; *A Manufacturer's Daughter*, 1901; and *My Japanese Prince*, 1904.

Gunter, Edmund (1581-1626), an Eng. mathematician, b. in Hertfordshire; educated at Westminster and Oxford. In 1619 he became Professor of Astronomy at Gresham College, London. He was the inventor of several useful mathematical devices, including Gunter's chain, used in land surveying, which is 22 yds. long and divided into 100 links; Gunter's line, being a logarithmic line laid down upon scales, etc.; Gunter's quadrant, used for finding times and altitudes; and Gunter's scale, employed in navigation and trigonometry. He published several mathematical treatises.

Günther, Albert Karl Lewis Gott-hilf (1830-1914), a Ger. zoologist. He published ten volumes of catalogue of the reptiles and fishes in the Museum, 1858-70. *Fische der Südsee*, 1873-1910, and *Reptiles and Batrachians of Central America*, 1885-1902, are two of his many original contributions to zoology.

Günther, Johann Christian (1695-1723), a Ger. poet, belongs to the Silesian school of poetry, of which,

indeed, he is the last representative of talent. Unfortunately, however, a youth of brilliant promise was wrecked by a deplorable lack of self-control, a deficiency which soon precipitated him down the path of drunkenness and mind-destroying dissipation. His poem on the peace of Passarowitz and his lyrics, which reveal a deep emotionalism and a fine imaginative range, won Goethe's praise.

Gurdaspur, the name of a tn. and dist. of British India, in the Lahore div. of the Punjab. The town, which was captured after a long siege by the Moghuls in 1712, has a population of 8906. The district (1889 sq. m.) has a pop. of (1921) 852,192.

Gurgaon, a tn. and dist. in the Delhi div. of the Punjab, British India. The district rebelled during the Mutiny. The commerce is chiefly in corn, hardware, and minerals. Pop. of town is 5107 and of district (1984 sq. m.) 682,003.

Gurhwal, see GARHWAL.

Guriev, or Guriev Gorodok, a dist. and tn. on the r. b. of the Ural, 11 m. from the Caspian Sea in the gov. of Ural'sk, Soviet Russia. Pop. 10,000.

Gurkhas, see GHURKAS.

Gurnard, or *Trigla*, a genus of fish belonging to the family of mailed-cheeks (*Triglidae*). Gs. are bottom-fish and are best caught, therefore, with a trawling net; they keep near the coast and are represented by as many as forty species in temperate and tropical seas. Along British shores the most common are the grey and red G. (*Trigla gurnardus* and *T. pinn.*). The head of a G. is angular and bony, but the two most characteristic features are three detached finger-like rays, projecting beneath its mouth, which are at the same time organs of motion and of touch, and the pectorals which, when expanded, make a young fish look like a butterfly.

Gurney, Edmund (1847-88), an Eng. psychologist, devoted his life to the serious and scientific study of what is known as 'Psychical Research.' At Trinity College, Cambridge, he obtained a good classical degree, and later turned his attention to music, medicine, chemistry, and physics. In his *Power of Sound*, he discussed the philosophy of music, but his fame rests on his psychological writings, including: *Hallucinations*, an essay, and *Phantasms of the Living*. The latter was a mass of data collected by G., Myers and Podmore during their experiments in hypnotism and thought-transference for the Society of Psychical Research. G. was led to believe in telepathy

by the weight of the evidence he amassed.

Gurney, Sir Goldsworthy (1793-1875), an inventor, began life by practising as a surgeon, and dis-appointed his patients when, shortly after 1823, he gave up the practice of medicine altogether. Faraday has acknowledged his indebtedness to G.'s course of scientific lectures, which were published in 1823. G.'s first invention was the oxy-hydrogen blowpipe; later he discovered the splendid light obtained by the fusion of magnesia and lime (the 'Drummond light'), and soon afterwards the high-pressure steam jet, which was to revolutionise locomotion and was also invaluable in the purification of sewer gas. The systems of lighting and ventilation in the present Houses of Parliament were devised by G.

Gurney, Joseph John (1788-1847), a philanthropist; became a minister of the Society of Friends, and in social work supported the unselfish efforts of Zachary Macaulay and Wilberforce. The two causes into which he threw his best endeavours were the abolition of slavery and the improvement of prisons. In the latter he worked side by side with his sister, Elizabeth Fry. In *Prison Discipline*, 1819, he unfolds his schemes of reform, whilst a Quaker's opinion of his own sect is revealed in his *Religious Peculiarities of the Society of Friends*, 1824.

Gustavus I. (Vasa), King of Sweden (1523-60), b. at Lindholm in 1496, the son of Erik Johansson of Ryd-boholm and Cecilia Mansdatter. In 1514 he was sent to the Court of his cousin, Sten Sture, and bore the Swedish standard in the Battle of Brännkyrka (1518), when Sture defeated Christian II. of Denmark. During the subsequent negotiations he was one of the Swedish hostages, and was treacherously carried off by the Danes and imprisoned at Kalø. He escaped and returned to Sweden in 1520. In 1520, roused with the rest of the nation by the news of the Stockholm massacre, he organised the revolt of the yeomen of Dalecarlia. The Danes were driven out and Gustavus was proclaimed king by the parliament of Strengnas and crowned in 1523. The task which faced him in establishing the independence of Sweden was full of difficulties, as the country was in great poverty and there was an utter lack of capable statesmen. He made a treaty with the Danes at Malmo in 1524, but never felt safe with regard to them. His projects for the strengthening of the national monarchy were in constant danger from

the Swedish peasantry, and between 1525 and 1542 he put down four rebellions. For political reasons he severed Sweden's connection with Rome and introduced the Reformation at the parliament of Westeras in 1527.

Gustavus II. (Adolphus) (1611-32), King of Sweden, was b. at Stockholm in 1594, the son of Charles IX. and Christina. He was carefully educated in languages, politics, military achievement, and Protestant principles, and succeeded to the throne in 1611 as a capable and practical ruler. In 1613 he terminated the war with Denmark by the peace of Knärod, and in 1617 the peace of Stolbova closed the Russian war and



GUSTAVUS ADOLPHUS

gave Karelia and Ingria to Sweden. In 1621 he resumed the war with Poland, of which the chief events were the capture of Riga and Mitau in 1621, the capture of Kokenhusen and the invasion of Lithuania in 1625, the Battle of Wulhof, completing G.'s conquest of Livonia, the occupation of Pillau, the conquest of Ermeland, the surrender of Elbing and Marienburg, and the blockade of Danzig in 1626, the disastrous campaign of 1627, and the defeat of G. by Koniecpolski at Stuhm in 1629. The war ended with the truce of Altmärk. G. then joined in the Thirty Years' War, partly from a sincere desire to help the Ger. Protestants, but still more from a fear that the emperor might acquire the Baltic ports and so menace Sweden. The Swedish fleet set out in 1630 and the army disembarked at

Peenemunde in June. A successful campaign in Pomerania followed, and later in the year Magdeburg declared in favour of G. This city was invested by the imperialists and early in 1621 G. advanced to relieve it. The suspicions and timidity of the electors of Brandenburg and Saxony frustrated his designs, and Magdeburg fell in May. In Sept. the elector of Saxony definitely threw in his lot with G., and the allies defeated Tilly at Breitenfeld, near Leipzig. G. then marched towards the Rhine, took Marienburg and Frankfurt and wintered in Mainz (1631-2), and then resumed the pursuit of Tilly. In April he forced the passage of the Danube and the Lech, and finally defeated Tilly at Ingolstadt. In July Wallenstein united with Maximilian of Bavaria, and G., attempting to reach Saxony, was confronted with the allied army and defeated at Nuremberg in Sept. Wallenstein then retired southwards, but was overtaken by G. at Lützen. A terrible battle was fought on Nov. 16, during which G. was killed, while Wallenstein was forced to retire upon Leipzig. G. was a wise and popular ruler, and succeeded in bringing the wealthy nobles and the lower classes into the working of a harmonious scheme. The government was reorganised on a departmental basis, and prosperity increased by the building of towns and the promotion of commerce. G. married Marie Eleonora, sister of the Elector of Brandenburg, in 1620, and had one daughter, Christina, who succeeded him. See C. R. L. Fletcher, *Gustavus Adolphus*, 1892.

Gustavus III. (1771-92), King of Sweden, was b. in 1746, the son of King Adolphus Frederick and Louisa Ulrica of Prussia. In 1766 he married Sophia Magdalena, daughter of Frederick V. of Denmark. In 1768, during his father's interregnum, he compelled the 'Caps' to summon a Diet which he wished to execute some monarchical reforms, but these were defeated by the 'Hats.' During the early part of 1771 he spent some time in Paris, where he was very popular, on a diplomatic mission. On his accession he attempted to mediate between the opposing 'Hat' and 'Cap' factions, which were leading the country into a position of great danger, but only succeeded in breaking the power of the oligarchical 'Caps' by the *coup d'état* of Aug. 19, 1772. The greater part of his reign was occupied in organising many useful reforms. In 1774 the liberty of the Press was provided for; the army and navy enlarged; in 1777 the 'currency realisation ordinance'

righted the national finances; free trade in corn was promoted, and religious liberty was proclaimed. In 1786 the mutinous spirit of his Diet caused him to adopt an attitude of absolutism, which he maintained throughout the war with Denmark and Russia (1788-90). He was assassinated at Anckarström.

Gustavus IV. (1792-1809), King of Sweden, was b. at Stockholm in 1778, the son of Gustavus III. and Queen Sophia Magdalena. In 1797 he married Frederica Dorothea, daughter of the Grand Duke of Baden. His character was marked by an abnormal seriousness and piety, which, added to a hatred and fear of Jacobinism, led him to act in a most mistaken way in several directions, notably with regard to the foreign policy of the country. In 1800 he joined the armed neutrality of the N. powers; in 1803 joined the Bourbon cause, and later allied himself with the coalition against Napoleon. In 1807 he refused the terms offered him by Napoleon, and thus lost Rügen and Stralsund, while Napoleon persuaded Russia to invade and annex Finland. By the end of 1808 it was obvious that G. was insane, and in May 1809 he was deposed. He *d.* in Switzerland in 1837.

Gustavus V., King of Sweden, was b. at Drottningholm in 1858, the son of Oscar II. of Sweden and Norway, and Sophia Wilhelmina; entered the army and travelled considerably. In 1881 he married Victoria, daughter of the Duke of Baden. He succeeded to the throne of Sweden in 1907, the union between Norway and Sweden having been dissolved in 1905.

Güstrow, a tn. in the republic of Mecklenburg-Schwerin, Germany. It stands on the Nebel, about 20 m. from Rostock, and contains several interesting old buildings, among them a cathedral, church, castle, and town hall. The manuf. of machines and other articles is carried on, and also a large trade in wool. Pop. 18,800.

Gut, technically used in zoology as equivalent to the alimentary canal. Three parts have to be distinguished: (a) The fore-gut or stomodæum lined by the outer layer or ectoderm; (b) the mid-gut or mesenteron lined by the inner layer or endoderm; (c) the hind-gut or proctodæum lined by the ectoderm. These three typical parts, thus distinguished according to their origin, vary greatly in size and function in different classes, but the mid-gut is the most important on account of its digestive function, and because of its outgrowths (liver, etc.) in higher animals. In vertebrate anatomy the pharynx, gullet, and

stomach are sometimes called fore-gut; the small intestine, mid-gut; the large intestine, hind-gut. In a human adult the small intestine is from 22 to 25 ft. long, and the large intestine, which is wider but much shorter, is connected to the small intestine at the ileo-cæcal valve.

Gut of Canso, a strait of Canada, situated between Nova Scotia and Cape Breton Island. It is 20 m. in length and from 1 to 2 m. wide.

Gutchkoff, Alexander Ivanovitch (b. 1863, at Moscow, of wealthy parents, engaged in textile industry). Was in the Bourse Committee and Congress of Commerce and Industry. Fought against British in Boer War; but became reconciled to England, which he visited 1909. Entered third Duma (one of the founders of Octobrist Party), 1907. President thereof. Failed to get seat in fourth Duma but was elected member of Council of State by Moscow Bourse Committee. In 1907 was offered seat in Cabinet by Stolypin. During Great War, after failure of 'bureaucratic management' of munitions became chairman of Central Industrial Munitions Committee and then Minister of War and Marine.



THORWALDSEN'S STATUE OF GUTENBERG, HOLDING MOVABLE TYPE AND THE NEWLY PRINTED BIBLE

Gutenberg, Johann Gensfleisch, or Henne (c. 1397-1468), a Ger. printer, was b. at Mainz. He is said to have been the inventor of the art of employing movable types in printing. About 1424 he settled in Strassburg, where he stimulated the art of block-printing by the invention of a press for the multiplying of impressions. At the end of 1444 he returned to Mainz and was occupied until 1450 trying to perfect his art. In that year he entered into partnership with a rich burgher named Faust or Fust, who lent him the money to set up a printing press. This partnership, however, was dissolved in 1455 when Faust brought an action against G. to recover his money, and in consequence of the verdict Faust secured the press. G., however, continued his work, but was not very successful commercially. The works ascribed to him are: *The Bible of 42 Lines*, which was sold in 1473 for £3400; *The Bible of 36 Lines*; and the *Catholicon*.

Gütersloh, a tn. in the prov. of Westphalia, Prussia, which is famous for its rye-bread (*pumpernickel*). It also manufs. silk and cotton goods, and has a large trade in Westphalian hams and sausages. Pop. 22,000.

Guthrie, the cap. of Oklahoma, U.S.A., and the county seat of Logan co. It was founded in 1889, and in 1890 made the capital of the territory, becoming the state capital in 1907, when Oklahoma was made a state. It has considerable trade with the surrounding country, and manufs. cotton-seed oil, cotton goods, flour, cereals, cigars, lumber, brooms, and furniture. Pop. 9582.

Guthrie, Sir James (1859-1930), a Scottish painter, b. June 10 at Greenock, son of Rev. John G., D.D. He first studied under John Pettie in London, but afterwards went to Paris. On his return he joined the young Glasgow painters and did a good deal of work in the open air. His first pictures, *The Gipsy Fires are Burning*, for Daylight is Past and Gone, and the *Funeral Service in the Highlands*, are rather highly coloured, but his later ones are better. *Schoolmates* is in the Ghent Gallery. He also painted portraits, some of his best being Mr. Galloway, Major Hetchkiss, and Professor Jack. He was president of the Royal Scottish Academy 1902-19, and knighted in 1903. He was also an hon. member of the Royal Academy, London. Died at Raromore, Dumbartonshire, Sept. 6.

Guthrie, Thomas (1803-73), a Scottish preacher and philanthropist, b. at Brechin, Forfarshire. From 1815-25 he was at the University of

Edinburgh, but in 1826 went to study in Paris. In 1830 he was ordained minister of the parish of Arbirlot, near Arbroath, and while here started a savings bank, a Sunday school, and a parish library. In 1837 he became one of the ministers of Old Greyfriars Church, Edinburgh, and in 1840 was appointed to St. John's parish there. He supported Dr. Chalmers in 1843, who was against the intrusion of civil authority into church gov., and his eloquence did much for the cause. He was also one of the first in Scotland to advocate compulsory education, and his name is associated with the cause of Scottish ragged schools, his *Plea for Ragged Schools* being published in 1847. Other works of his are: *The Gospel in Ezekiel*; *The City, its Sins and Sorrows*; *The Way to Life*; *Christ and the Inheritance of the Saints*. G. was also the first editor of the *Sunday Magazine*.

Guthrie, Thomas Anstey, see ANSTAY, F.

Guthrum (d. 890), one of the leaders of the Danish host which encamped near Reading in 871, and fought against Æthelred and Alfred. He was finally defeated by Alfred at Ethandun in 878, and a treaty was made at Wedmore whereby G. pledged himself to withdraw from Alfred's kingdom. He afterwards occupied E. Anglia, and was baptised at Aller, Alfred standing godfather to him.

Guthry, Henry (c. 1600-76), Bishop of Dunkeld, b. at Cupar-Angus. In 1632 he was presented by Charles I. to the Parish Church of Stirling, but opposed the king in 1636, when he was about to introduce a liturgy. In 1665 he was translated to the bishopric of Dunkeld. He was the author of *Memoirs of Scottish Affairs, Civil and Ecclesiastical, from the year 1637 to the Death of Charles I.*, a book which is of value as a contemporary account.

Guts Muths, Johann Christoph Friedrich (1759-1839), a Ger. teacher, b. at Quedlinburg. He was educated at Halle University, and in 1785 became a teacher of geography and gymnastics at Schnepfenthal. He introduced a new method of teaching geography, and it was largely owing to him that gymnastics became so popular in the schools of Germany. His handbooks explain his methods: *Gymnastik für die Jugend*; *Handbuch der Geographie*; but he also published *Deutsches Land und Deutsches Volk*.

Gutta-percha, the name applied to the dried milky juice of trees found mainly in the islands of the Malay Archipelago. These trees belong to the order Sapotaceae, and often reach

a height of 100 ft. and have trunks varying from 2 to 3 ft. in diameter. The name G. is Malay *getah*, meaning gum, and *percha* being the name of the tree. The substance, which is similar to india-rubber, was formerly obtained by cutting down the tree and then stripping off the bark, but now the less destructive method of tapping the trees is employed. The milky juice soon coagulates on exposure to the air and is then kneaded under a supply of running water and rolled into sheets to expel the air and to enable it to dry quickly. It is afterwards put into a masticator, which is heated, and revolved until it is fit for use. There are various kinds of G., but that from Singapore is considered the best. The substance has long been known to Europeans, having been imported in the form of native shoes, etc., but it was not until 1843 that they realised its value, or knew of its nature and usefulness. Dr. William Montgomerie, of the Indian Medical Service, first noticed that the Malays used it for making handles to their knives, etc., and conceived the idea of employing it for medical instruments. After this it was imported to a great extent, and used for coating marine electric telegraph wires (although it has now been superseded by india-rubber), for making golf-balls, overshoes, beltings for machinery, tubing, etc., as well as for stopping teeth. It is also used by surgeons for splints, but it is chiefly employed now for electrical purposes because of its inability to conduct electricity. When imported, G. appears in hard cakes of a reddish-brown colour, and when cut has a peculiar cheese-like smell. It becomes soft when put into hot water, and can be drawn out into threads, but hardens on cooling and is not brittle. It is not affected by alkaline solutions or by dilute acids, but rapidly deteriorates when exposed to air and light. It differs from india-rubber in being non-elastic.

Gutzkow, Karl Ferdinand (1811-78), a Ger. dramatist, b. at Berlin. He studied theology at the University of Berlin, but the publication of his *Forum der Journalliteratur*, in 1831, began his literary career. The same year he joined Menzel in Stuttgart, and worked on the *Litteraturblatt*, and in 1832 published *Maha-Guru*, a satirical romance. In 1835 his *Wally, die Zweiflerin* appeared, for the publication of which he was imprisoned, having shown himself in this book to be an advocate of the 'Young Germany' movement. On his release he went to Frankfurt and Hamburg, where he wrote his tragedy *Richard Savage*, 1839. Other plays

of his are: *Zopf und Schwert*, 1844; *Das Urbild des Tartüffe*, 1847; *Der Königsleutnant*, 1849, all three of which are comedies; and *Uriel Acosta*, a blank-verse tragedy. In 1847 he became director of the Court Theatre, Dresden. He was also a writer of novels, *Seraphine* appeared in 1838 and *Blasedow und seine Söhne*, a satire on the education of the day. His *Die Ritter vom Geiste* was published in 1850-2 and *Der Zauberer von Rom*, a picture of Rom. Catholic life in S. Germany, 1858-61. G.'s works contain some very fine character drawing and are of interest for the glimpses they afford of the conflicts and intellectual problems of his time, but they are marred by the fact that he could not subordinate his political opinions to art.

Guy, Thomas (1644-1724), the founder of Guy's Hospital, *b.* in Southwark. He was educated at Tamworth, and in 1660 was apprenticed to a bookseller, but in 1668 set up in business for himself. By his trade, chiefly in Bibles, and his investments, especially in the South Sea Company, he amassed a large fortune, and in 1695 became member of parliament for Tamworth, where he had founded an almshouse in 1678 for six poor women. He also built a town-hall for Tamworth in 1701, which is still standing. In 1709 he contributed largely for the poor refugees from the Palatinate, and in 1712 subscribed to the fund for Bowyer, the printer, after his great loss by fire. In 1704 he became governor of St. Thomas' Hospital, and in 1707 built three new wards at a cost of £1000 and contributed yearly towards their support. In 1722 he began the erection of Guy's Hospital, on which he spent £18,793, and when he died left for its endowment £200,000. He endowed Christ's Hospital with £400 a year.

Guyenne, *see* GUËNNE.

Guy of Warwick, the hero of a middle Eng. romance, versions of which existed in Fr. in the thirteenth century. The story is an account of Guy's foreign wars and of his marriage to Félice, daughter and heiress of the Earl of Warwick. His pilgrimage to the Holy Land is also related, and his defeat of the giant Colbrand, by whose death Winchester was delivered from the invading northern kings.

Guyon, Mme. (*née* Jeanne-Marie Bouvier de la Motte) (1648-1717), a Fr. mystic, *b.* at Montargis. She was acquainted with the Duchesse de Béthune, and was also very friendly with Father Lacombe, who was imprisoned for his mysticism in 1687. She preached her doctrine of quietism at Turin, Grenoble, Nice, Genoa, Vercelli, and Paris, where she settled

in 1686, but was arrested in 1688 for having taught heretical opinions and for having corresponded with Molinos, the leader of quietism in Spain. After her release she became acquainted with Fénelon, who supported her teaching and conduct in a controversy with Bossuet. She was again imprisoned in 1695 and not released till 1702. Madame G.'s works, in 40 vols., including the *Autobiography*, were published, 1767-91.

Guyot, Yves (*b.* 1843), a Fr. journalist, publicist, and statesman, *b.* at Dinan (Côtes-du-Nord); became editor of *L'Indépendant du Midi*, published at Nîmes, in 1868. In 1892 he was attached to *Le Siècle*, and has been editor of *Le Journal des Economistes* since 1909. He has always been a Liberal in policy and is an ardent Free Trader. During the S. African War he sided with Great Britain, and was one of the first to take up the cudgels on behalf of Dreyfus. His attacks upon the Police des Mœurs and their methods of dealing with prostitution caused him to be imprisoned for some months. He was a member of the Chamber of Deputies (1885-92) and Minister of Public Works (1889-92). His works, principally on political economy and labour questions, include the following: *The Sugar Question*, 1901; *Conflits du Travail et leur Solution*, 1903; *La Science économique* (3rd ed. 1903); *La Tyrannie protectionniste*, 1905; *Le Commerce*, 1909; *Les Préjugés économiques*, 1909; *Les Chemins de fer et la Grèce*, 1911. In collaboration with M. Raffalovich he published *Le Dictionnaire du Commerce, de l'Industrie et de la Banque*, 1901.

Guynon de Morveau, Louis Bernard, Baron (1737-1816), a Fr. chemist, *b.* at Dijon. He studied law in the university at Dijon and became a member of the legislative assembly in 1791, and was a member of the national assembly in 1792 and 1795. From 1800 to 1814 he was master of the mint, and was made a baron in 1811. He contributed largely to the scientific periodicals of the day, and also published *Méthode d'une nomenclature chimique*; and *Traité des moyens de désinfecter l'air*, which describes the disinfecting powers of chlorine and of hydrochloric acid gas.

Guzerat, *see* GUJERAT.

Gwalior, one of the largest native states of Central India, lies between the United Province and the Central Provinces. The state consists of hilly country and plains. The climate is extreme. The hilly part contains the small district of Amlighera. Area 29,000 sq. m.; pop. 3,000,000. The capital is G., or Lashkar; it is strongly

fortified, the fortress being on a rock 340 ft. high. From 1854 to 1855 it was in British hands. It is a centre for stone-quarrying and the carving industry. There is a fine irrigation system and good railway. Pop. (1921) 3,186,075.

Gwelo, the central tn. of Southern Rhodesia, S. Africa. It is situated midway between Salisbury and Bulawayo, being 113 m. N.E. of the latter town by rail. White pop. 400.

Gwersyllt, a par. and tn. of Denbigh, Wales, 2½ m. N.N.W. of Wrexham, situated in a colliery district, with iron works. Pop. 5671.

Gwynnett, Button (1732-1777), an American politician, b. in England; went to Georgia where he purchased land; elected to Congress, 1776, and signed Declaration of Independence. He competed with Colonel Lackland McIntosh for office of brigadier-general, and as the result of a subsequent quarrel challenged him to a duel. He was killed.

Gwynn, Nell (1650-87), an Eng. actress, and the mistress of Charles II. Of her early history very little is known, but when quite young she sold oranges somewhere near Drury Lane. She afterwards joined the acting profession, and made her first appearance in 1665 as Cydaria in Dryden's *Indian Emperor*, and afterwards in many other witty parts, being a general favourite with the public. Her two sons by Charles were Charles, made Duke of St. Albans, and James Beauclerk, who d. young.

Gwynne, H. A. (b. 1866), editor of the *Morning Post*. In 1896 he accompanied Lord Kitchener's expedition to Dongola as Reuter's chief war correspondent, following the operations of the Turkish-Greek war in 1897 in the same capacity. In 1899 he sailed for S. Africa and organised Reuter's war service for the Boer War, taking part in many of the minor operations. He became editor of the *Standard* in 1904, but resigned in 1911. President of the Instit. of Journalists, 1929. He has published *The Army on Itself*.

Gyangze, a fortified tn. of Tibet, situated on the trade route between Lhasa and Darjiling. In 1904 the English entered this town when on an expedition.

Gyaros, Ghiura, or Giura, one of the Cyclades Is., about 10 m. from Syra. This island was used as a Roman place of banishment.

Gyges, King of Lydia, was the founder of the Mermnad dynasty in the seventh century B.C., having put to death Candaules, his predecessor and last of the previous dynasty. During his kingship he captured Smyrna, Colophon, and other cities,

and was successful against the Cimmerians. After helping the Egyptians against the Assyrians, he was again attacked by the Cimmerians, who took Sardis and put him to death.

Gylippus, son of Cleandridas, an exile from Sparta, was a Spartan general. In 414 B.C. G. was appointed commander of the Syracusans against the Athenians, and in this he was entirely successful—Nicias being defeated. Afterwards, however, he was entrusted by Lysander with treasure from Athens, and on being found guilty of appropriating some, was exiled as his father had been.

Gyllembourg-Ehrensvärd, Thomasine Christine (1773-1856), a Danish writer, b. at Copenhagen. When quite young she (then named Buntzen) married Peter Heiberg and became the mother of Johan Ludvig Heiberg. She was afterwards divorced and then married Baron Ehrensvärd. Her first novel, *Familjen Polonius*, appeared in 1827 in the journal known as the *Flyvende Post*. Among her other works are: *En Hversdags historie*, 1828; *To Tidsaldre*. See J. L. Heiberg, *Peter Andreas Heiberg og Thomasine Gyllembourg*, 1882.

Gyllenstjerna, Johan (1635-80), a Swedish statesman. After travelling in various countries, he returned to Sweden and took an active part in politics there. He sided with the country against the aristocrats, to whom he belonged, putting the national interests before all others. About the year 1675 he became the adviser of Charles XI., and obtained an influence over him which lasted throughout his reign. In 1679 he was the chief promoter of peace at the Congress of Lund.

Gymnastics, a term signifying physical exercises practised for recreation or for promoting health. The gymnasium of the Gks. was originally the school where competitors in the public games received their training, and was so named from the circumstance that the competitors exercised naked (*γυμνός*). Athletic contests formed part of the social life of the Gks. from earliest times. The victor in any such contest was rewarded with the honour and respect of his fellow-citizens, and a victory in any of the religious festivals was looked upon as an honour to the whole state, for religious festivals were marked by contests and games. In these circumstances the training of athletes became a matter of public concern, accordingly special buildings were provided by the state, and their management was entrusted to public officials. Men were paid to look after the youths who were training for public contests, to conduct the games

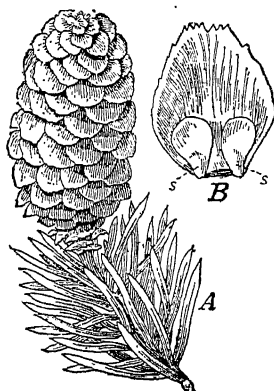
at the great Athenian festivals, to exercise general supervision over the morals of the youths, and to adorn and keep up the gymnasium. This office was one of the public services, and great expense was entailed on the holders. Under them were the *sophronistæ*, whose duty was to watch the conduct of the youths at all times, and especially to be present at all their games. The practical teaching and selection of suitable exercises for each youth were in the hands of the *pedotribæ* and *gymnatai*, the latter of whom also superintended the effect on the constitution of the pupils, and prescribed for them when they were unwell. The *aleiptæ* oiled and rubbed dust on the bodies of the youths, acted as surgeons, and administered any drugs prescribed. According to Galen there was also a teacher of the various games of ball. The gymnasia, built to suit these various purposes, were large buildings, which contained not merely places for each kind of exercise, but also a stadium, baths, covered porticos for practice in bad weather, and outer porticos where the philosophers and men of letters read public lectures and held disputations. The gymnasium of the Gks. did not long remain exclusively devoted to athletic exercises. It soon began to be put to other even more important uses. The gymnasium became connected with education on one side and medicine on the other. Due training of the body and maintenance of health and strength of children were the chief part of the earlier Gk. education. The education of boys was conducted in the gymnasia, save that part devoted to letters and music. As they grew older, philosophers and sophists attended to talk and to lecture in the gymnasia. In Athens there were three great public gymnasia—Academy, Lyceum, and Cynosarges, each of which was consecrated to a special deity, with whose statue it was adorned; Plato's teaching in the Academy has given that gymnasium immortality. Aristotle conferred lustre on the Lyceum, and Cynosarges was the resort of the Cynics. Plato, when treating of education, devotes much time to G. Prodicus is said to have first pointed out the connection between G. and health. The Gk. institution of the gymnasium never became popular with the Romans, who thought such training was conducive to idleness and immorality, and of little use from a military point of view, though at Sparta G. training had been chiefly valued as promoting bodily strength, such as was needed for the use of weapons and the endurance of hardship. The first public gymnasium at Rome was built by

Nero, and another by Commodus. Rousseau in his *Emile* was the first in modern times to call attention to the serious consequences of neglecting G. And Pestalozzi and Froebel, the Ger. educational reformers, emphasised the need for systematic physical training. It was not till the end of the nineteenth century that G. were regarded in England as more than recreation, and at present the larger public schools and universities are supplied with elaborate gymnasia, and even the children in the council schools are taught simple G. exercises. In Germany the state not only controls the practice of G., but makes it compulsory for every child and adult to undergo such training; in France, too, such training is under gov. control. In Sweden, Denmark, Switzerland, Italy, and Russia, systems are more or less distinct and enjoy a wide popularity. The Swedish system so greatly in vogue to-day was instituted by Pehr Henrik Ling (1776-1839) early in the nineteenth century for the Swedish children in school. By the end of the century it was recognised by adults also, and in a short time it was widely practised throughout athletic Europe, entering even into military training. The rhythmic method of gymnastics, founded by Emile Jaques-Dalcroze (*q.v.*) and known as *Eurhythmics*, was a development of the twentieth century, and though it enters into the curriculum of many trained gymnasts, it is more correctly looked upon as a mode of dancing. See C. A. Forbes' *Greek Physical Education*, 1929; E. N. Gardiner's *Athletics of the Ancient World*, 1930; A. J. Butler's *Sport in Classic Times*, 1930; also C. A. Westerblad's *Ling, the Founder of Swedish Gymnastics*, 1909; E. Jaques-Dalcroze's *Eurhythmics*, 1930.

Gymnosophists (Gk. *γυμνός*, naked, *σοφιστής*, sages) was the name given by the Gks. to those Hindu philosophers who practised the most rigorous asceticism, regarding food and clothing as hindrances to purity of thought. They often lived as hermits in forests, and some, like Kalanus, even burned themselves to death to enter a state of purer being.

Gymnosperms (plants with naked seeds), one of the two divisions of phanerogams or flowering plants. It differs from the other group, the angiosperms, in the fact that there is no closed ovary in the female flower at the time of pollination. When this process takes place the cone scales are separated from one another sufficiently to leave an open passage down to the ovules, and it is upon the

micropyle of the ovule itself that the pollen falls. Thus there is no need for a stigma and style. After pollination the scales close up so as to shelter the developing seeds, opening again when the latter are ripe, so as to allow them to escape. The flowers are all unisexual, and are generally without a



GYMNOSPERMS

A. Twig of fir tree bearing a young female cone; B. Ovaliferous scale from A showing two ovules on the under surface

perianth. The plants of this class are all perennial trees and shrubs, for the most part evergreen; they are classified into the three natural orders Cycadaceæ, Conifereæ, and Inetaceæ.

Gympie, a tn. of Queensland, Australia, lying 107 m. N. by W. of Brisbane, and the centre of a gold-mining district. Pop. 6519.

Gynæcology (Gk. *γυνή* woman; *oikos*, abode), is the study of diseases of women, and is particularly concerned with diseases of the urinary and genital organs. At the beginning of the nineteenth century it was realised that this study was sufficiently extensive to constitute a special branch of medicine, and the gynæcologist specialises in the investigation and treatment of such diseases.

G. is concerned with the structure and functions of the organs of the urogenital system; with the symptoms and possible causes of interference with the normal working of these organs; and with the prevention and cure of disorders affecting them.

The chief disorders are those due

to malformation, displacement and disease.

Malformation of the organs of reproduction may be due to arrested development, resulting in the absence of certain organs or in their failure to develop to their normal size, or it may be caused by faulty development or the growth of organs characteristic of both sexes. Most malformations cannot be rectified, but displacements of the uterus or ovaries is much more amenable to treatment. Displacements are due usually to difficult childbirth or to undue strain during pregnancy, and operations are sometimes necessary to rectify them.

Minor operations were performed in the sixteenth century, sometimes by men who were experienced in cattle-breeding. The first recorded operation seems to have been that of Jacob Nufer, a sow-gelder, who in 1500 successfully operated on his wife. This marked the beginning of operative G., and later in the century a comparatively large number of other Cæsarean operations were recorded. The first book on operative G., as the term is now understood, was published in Holland in the seventeenth century by Hentrik van Roonhuyze, and in the latter half of this century operative G. became established as a specialised branch of G. Ephraim McDowell and James Marion Sims have been described as 'the founders of operative G.' Working in the S. States of N. America, in the latter half of the eighteenth century, these two men successfully performed various operations on the genital organs, and marvellous progress has since been made in gynæcological surgery.

There are many different diseases of the urogenital systems and some are highly contagious. Prevention and cure of venereal diseases are particularly important, for they may infect the infant during birth.

Malignant growths may be formed on the reproductive organs, and seem to be more liable to occur at the climacteric or 'change of life,' when menstruation ceases. Nervous disorders also frequently accompany the bodily changes that take place at this period, and medical advice may then be very helpful. Especial care may also be necessary during puberty in the establishment of regular menstruation and the prevention of anæmia.

Psychological factors are frequently responsible for many female ailments, and if there be no apparent physiological reason for the ailment the gynæcologist may recommend psychological treatment.

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men, by Ten Teachers; *History of Medicine*, Garrison.

Gyndes, an anct. river of Assyria. It has been identified with various modern rivers, among them the Diala and the Mendeli.

Gyoma, a vil. situated in the prov. of Békés, on the Körös, Hungary. Pop. about 12,000.

Gyöngyös, a tn. in the co. of Heves, Hungary. This town possesses a Franciscan monastery, and trades in dairy produce and wine. Pop. over 19,000.

Gyp, pseudonym of Sybille Gabrielle Marie Antoinette Riquetti de Mirabeau, Comtesse de Martel de Janville (b. 1850), Fr. novelist, b. at the château of Koëtsal in the Morbihan. She began by writing stories for the *Figaro* and the *Vie Parisienne*, but afterwards published numerous other novels in which she describes the society of Paris. In 1882 *Petit Bob* appeared; in 1883 *Autour du Mariage*, which has run through over ninety editions. Other notable works are: *L'Education d'un prince*, 1890; *Ohé! la grande vie*, 1891; *Mariage Civil*, 1892; *Le Bonheur de Ginette*, 1896; *Trop de chic*, 1900; *Un Ménage dernier cri*, 1903; *Maman*, 1904; *Le Cœur de Pierrette*, 1905; *Bijou*; *Journal d'un Casserole l'âge du Toc*; *La Bonne fortune de Toto*; *La Meilleure Amie*; *Les Flanchards*, 1917; *Le Journal d'un Cochon de Pessimiste*, 1918; *Souvenirs d'une Petite Fille*, 1927-8; *Du Temps des Cheveux et des Chevaux*, 1929.

Gypæstus, a genus of birds of the sub-family Gypætinæ, family Falconidæ. They are birds of prey, and are natives of the mountain regions of Africa and Asia, also some parts of Europe. Among them may be mentioned *G. barbatus* (lammergeier).

Gypogeranus, see SECRETARY BIRD.

Gypsies, or Gipsies, a wandering race scattered over the world, and found throughout Europe, in W. Asia and Siberia, Egypt, N. Africa, America, and Australia. It is impossible to estimate their numbers exactly. Their total number in Europe is probably over 900,000. They are in greatest numbers in Hungary, Rumania, and Turkey. The figures for Hungary have been given as 280,000 (in 1910), for Rumania as about 250,000, for European Turkey 117,000 (in 1903), and for Asiatic Turkey about 80,000. Austria has over 16,000, and France and Germany about 2000 each. For the British Isles it is estimated that there are some 12,000 G. It would be mere guesswork to state how many thousands of these nomads are settled or are wandering in America, Africa, and Australia.

The word G. is a corruption of Egyptian, and is found in different forms throughout Europe: *Gyptenaer* in the Netherlands; *Ægypter* in Germany (sixteenth century); *Gitano* in Spain; and *Gyphtos* in modern Greece. The name no doubt arose from the tale which they spread on their first appearance in Europe, that, for refusing to apostatise, they had been driven by the Saracens out of 'Little Egypt,' by some supposed to be a confusion between Little Armenia and Egypt, and by others identified with Epirus. The other name of the G. is *Atzigan*, or *Atzingan*, derived, according to Miklosich, from the *Athinganoi* ('not to be touched'), a heretical sect formerly inhabiting parts of Asia Minor. This name appears in Rumania under the form of *Tsigan*, in Turkey *Tshingian*, in Hungary *Czigany*, in Germany *Zigeuner*, in Italy *Zingari*, and in Spain *Zincali*. G. have also been known as *Faraon* and *Phærao-Nephka*, again indicating their supposed Egyptian origin, *Heydens* or *Heidens* ('heathens'), Saracens, Bohemians, and Tartars. They have, too, been called Gks., Gers., Flemings, etc., apparently from the country from which they happened to have come last. The G. call themselves *Rom* (feminine *Romni*), which may be derived from *Droma*, Indian, or more likely from *Romanoi*, the name applied to themselves by the Byzantines of the Grecian empire.

The Athinganoi mentioned above were magicians, soothsayers, and serpent charmers who lived in Asia Minor as early as A.D. 810. According to one tradition they were the descendants of Samer, an outcast, since he fashioned the Golden Calf for the Israelites in the desert. The G. cannot definitely be identified with these Athinganoi, but it is known that G. passed into Europe from the further side of the Bosphorus in the early fourteenth century, and traces of people with peculiarities not unlike those of the G. may be found in E. Europe and Asia Minor prior to that century. In the rhymed paraphrase of the Genesis, written before 1122 (ed. Ditmar, 1862), there is a passage referring to the 'Ishmaelish folk,' descended from Hagar's son. The writer calls them *Chalt-smide* ('iron-workers'), and says of them, 'They have neither house nor country; every place is the same to them. They roam about the land, and abuse the people by their knaveries. It is thus they deceive folk, robbing no one openly.' It is certain that as early as the tenth century there were itinerant smiths or tinkers, who sold their wares in

many countries. The *Komodromoi* ('village-roamers') mentioned by Theophanes as hailing from Italy in 554 were probably smiths of the same order as the Chaltsmide. Even if G. may not with certainty be identified with these vagrant pedlars, it is extremely probable that they assimilated them in large numbers. *Atkinson*, 'sorcerers and famous rogues,' lived at Constantinople about 1050, and an unnamed race, who 'wander like a cursed people' and dwell in 'little, oblong, black, low tents, like those of the Arabs,' are mentioned in Friar Simon's *Itinerarium* as living in Crete in 1322. It is certain that G. existed in Confu before 1326, and twenty years later they were reduced to a state of serfdom by the Empress Catherine de Valois. There can be no doubt that by the fifteenth century they had been settled for a long time in the Balkan Peninsula and in many of the countries N. of the Danube. They had possibly already made their way further W., but there is no very good authority for their appearance in W. Europe before the beginning of the fifteenth century. In 1414 a troupe of G. is said to have arrived in Hesse. In 1417 a large company of them, bearing letters of protection from the Emperor Sigismund, who declared that they were Christian penitents engaged on a seven years' pilgrimage, were well received by various Western towns. Some had reached Hamburg, Wismar, and Lübeck in 1417; others arrived in Switzerland, Leipzig, and Frankfort-on-the-Main in 1418; they entered Bologna on their way to Rome in 1422; and reached Paris in 1427. In 1423 a second immigration followed, led by Ladislaus, *Woiwode* ('count') of the Cigani, who also was furnished with letters of protection by Sigismund, and who appears to have hailed from Hungary. Between 1438 and 1512 the G. came in hordes, swarming over Germany, Italy, and France. They probably reached England and Scotland about 1500. The exodus of the G. from Rumelia and the Eastern countries is generally accounted for by incursions of Turks who subdued the kingdoms of Greece, Serbia, and Bulgaria. *The Constitutions of Catalonia* (1512) speaks of the G. as Gks., which shows that they continued for a time to live in Greece under Turkish rule. The most nomadic of the tribes probably first moved to Walachia and Transylvania, and then, as others followed in ever-increasing numbers, moved further and further westwards.

From the earliest description of G., it is evident that they then possessed those peculiarities of physique and

mode of life which distinguish them to-day. The G. who settled in Germany in 1417 are described by Krantzius in his *Saxonia*, and subsequently by Münster in *Cosmographia*. Most of them bivouacked in the fields, while their count and knights sometimes put up for the night in an inn. Some of them rode on horseback, others following on foot, while the women and children travelled in waggons. They had no honest means of livelihood, but practised palmistry and fortune-telling, and before very long became notorious for dishonest dealings and for theft. In appearance they were described as being black and dirty. At first they were well received, if not welcomed by the chief towns of Europe. At Utrecht, in 1429, they were given pots of ale, bread, and a hundred herrings, probably because they had a 'written permission from the Pope to visit the Christian land,' and in the following year twenty schellings were paid from the public purse of Middelburg to a count of 'Litill Egypt.' In 1505, James IV. of Scotland gave Antonius Gaguinus, a count of Little Egypt, letters of recommendation to the King of Denmark. They were entertained by the Earl of Surrey in Tendring Hall, Suffolk, in 1519, and were given 'two towers for their residence' by Sir William St. Clair, whom they had delighted by their dancing and acting. But before very long their popularity had waned. Middelburg, which had previously given generous hospitality to the wandering strangers, in 1460 sent Constantine, Count of Egypt, a bribe of ten schellings that his troupe might not visit the town. Country-folk had been gulled by these wily, insinuating visitors, and small farmers and owners of barns looked forward with dread to any repetition of their visits. Those in authority found it impossible to legislate for people who had gone as soon as they had come and might reappear as suddenly, and consequently classed them wholesale as vagabonds and outlaws and treated them accordingly. In 1560 an ordinance of the states of Orleans enjoined all Bohemians or Egyptians to quit the kingdom under pain of death, and similar edicts had been and continued to be issued in many European countries. At Durham, in 1592, five men were hanged 'for being Egyptians,' and at Edinburgh, in 1611, four met with the same punishment 'for abiding within the kingdom, they being Egiptienis.' In Hungary and Germany G. were racked and tortured as late as the eighteenth century. They were also accused of definite malpractices and

crimes, often without any foundation. As early as 1424 they were thought to be emissaries of the Turks, probably on account of their dark, foreign faces and strange tongue. Certainly they were used as spies by Frederick the Great. But far more dreadful crimes than treachery and stealing were attributed, most unjustly, to the G. In 1692 four Estre-madura G. were taken captive and under the torture of the Inquisition confessed that they had devoured a friar, a pilgrim, and a woman of their own race, and were in consequence put to a painful death. The charge of cannibalism was first made in 1547. In Hungary, in 1782, forty-five G. were hanged, drawn, and quartered on a charge of having eaten the victim of a supposed murder. The case was subsequently inquired into and the charge was proved false, for there had been no murder. Since the beginning of the seventeenth century G. have frequently been charged with kidnapping children, and many lurid tales have been told and written on the subject. In 1872 forty-seven G. were imprisoned in Germany for child-stealing, but the charge was afterwards proved false. G. have frequently been deported from one country to another, as from Scotland to the Barbadoes, and other American colonies in 1665 and 1715, and from the Basque country to N. Africa in 1802. Even in the twentieth century Ger. legislation has been busy with the G. problem. In Rumania and E. Europe, a certain class of G., called *Robi*, were deprived of their liberty, bought, sold, and exchanged, and treated as slaves. They were granted freedom in Hungary and Transylvania between the years 1781 and 1782, and in Moldavia in 1856. The Empress Maria Theresa interested herself on their behalf, and ordered those G. in her states to be instructed in agriculture with a view to their permanent settlement. A great improvement became evident in their character and bearing, and in 1866 they were declared Rumanian citizens with full political rights. The G. of Bulgaria have not enjoyed similar privileges, and in 1906 held a congress at Sofia, protesting against their political status and demanding their recognition as citizens.

G. from the beginning of their history have shown great versatility in turning their hands to any kind of work. In Rumania and Turkey a large proportion of the settled, nationalised G. are bricklayers. In Hungary and Transylvania many of them follow some regular trade and have fixed habitations. They wash gold from the sand of the rivers, and

they work iron or copper; some are horse-dealers, others are carpenters and turners, and some even keep wine-shops or public-houses. In England, they are generally thought of as hawkers, tinkers, knife-grinders, showmen, and basket-weavers. The nomadic G. still carry on the traditional craft of metal-work, while some make sieves and traps. They also have cast bells, the church bell (1726) of Edzell in Forfarshire being their work. In Scotland they were engaged during the eighteenth century on pewter, copper, and lead work, and also executed some engravings and paintings in somewhat primitive fashion. They were also known by the bullets and cannons they fashioned in Hungary, and had an iron-foundry at Little Carron in Scotland. They make excellent farriers and good horse-dealers. They are far-famed for their musical talent. The G. musicians, it is thought, originally belonged to the serf class, and were kept within the precincts of courts and palaces to provide entertainment. The women were regarded as particularly graceful dancers, and danced to the accompaniment of the fiddle. In 1530 we hear that they 'dancit before the king in Holyrud-house' in Scotland. They won a high reputation in Wales as harpists, and in Hungary as fiddlers. In fact, Liszt declared, though his theory has been hotly disputed, that the Hungarian national music originated in them. G. show special talent in singing or reciting old ballads and folk-songs, often to the accompaniment of the guitar. They have, too, a great aptitude for telling fairy stories. These tales do not appear to belong to their own tribe, but to have been picked up in the various countries which they have visited, and are passed on by word of mouth from one generation to another. In this connection their extraordinary gift of speaking in foreign languages may be mentioned. The G. women are famous fortune-tellers. They seldom repeat their charms and incantations in their own tongue, but in Gk. or Rumanian in a Romanised dialect. They tell fortunes not only by palmistry but by playing cards. They use the Tarock, a special set of cards, each card having a mystical meaning of its own, the secret of which they keep within their own tribes. It is quite possible that playing-cards were first brought into Europe by the G., and were originally only used for telling fortunes and for lotteries, later being employed for games and gambling. G. were formerly despised for their looks; the writers probably being unable to

recognise their undoubted beauties behind the dirt. They are dark-skinned, with dark, lustrous eyes, thick dark hair, often coarse and frizzled, and gleaming white teeth. They show off their darkness by wearing bright Oriental colours. The women bind their hair with gaudy silk handkerchiefs, and show an inordinate love of jewellery. Though paying great attention to their clothes, they are at the same time shabbily and untidily dressed, and are slovenly in their habits. Their great moral defects are probably due to the vagrant life the race has lived from its beginning. G. as a whole have no sense of responsibility, and have not the same sense of honour as other European races. They are not religious by nature, but frequently adopt the prevailing religion of the country in which they travel. Many of them still retain old superstitions, probably the remnants of a religion they have lost. Some of these superstitions, such as the worship of trees and serpents, may be found in their folk-tales and songs. G. seldom go to church, except to baptise their infants, to marry, and to bury their dead. They are fatalists, and have the philosophy of the open high-road. To their friends they are loving and lovable, and generous to excess, but they mostly dislike and despise all who dwell in houses.

Language.—The G. language (*Romani chiv*) is split up into very many dialects, those of the E. and W. of Europe being so different from each other that an Eng. G. would have great difficulty in understanding a Gk. G., and possibly could not understand him at all. But there is no doubt that originally there was only one G. tongue, and that the existing differences in the dialects are due to the adoption of words and idioms of the different peoples with which this remarkable race has come into contact. The researches of Ruediger (1782) and Grellmann (1783) in Germany, and of Marsden (1783) in England proved that the language of the G. was unmistakably connected with some Indian language. Some of the words in the G. language have a more archaic form than those of modern Indian dialects, and it is impossible to determine to which of them it is most closely allied. The speech of the Armenian G., however, shows more resemblance to Prakrit than does the speech of the European G., and the speech of the Asiatic or Syrian G. is peculiar in itself, and entirely different from any other dialect. These facts have led scholars to think that the G. originally came from India; that there

must have been at least two great movements westward, the first horde of G. making their way to Greece, and the second horde moving southwards to Syria and N. Egypt. The route taken can be determined in part from the elements other than Indian present in the G. vocabulary. Now, there is in it a large percentage of Persian words, but, according to Miklosich (1878), no Arabic element. This shows that the G. could not have resided in Persia long after the Mohammedan conquest to have been so completely unaffected by the language of the conquerors, and that they must have made their way to Europe via Persia and not through Arabia. That is to say, the movements from the East must have taken place before the middle of the seventh century A.D. The G. tongue possesses far more Gk. than Persian words, so that it may safely be concluded that their stay in Greece was more prolonged than it had been in Persia. Some scholars have thought that they lived in Greece from very early times, but this theory cannot be accepted, for the G. vocabulary contains no old forms of Gk. and no archaic forms of Slavonic words. The G. of Wales and of Turkey speak the purest gypsy, and retain the oldest forms. The language of Eng. G. shows an almost complete loss of grammatical inflections and an adoption of Eng. forms and idioms. In Spain, Italy, Norway, and other countries the same process of levelling has been taking place, and in many cases the original inflections have been superseded by those in use among their neighbours. Consequently the language has deteriorated in grammar, but from the earliest times its vocabulary has been enriched by the adoption of foreign words. Modern legislation has tended to crush the national spirit of the G. In a country like England, where attendance at the national schools is compulsory, where G. children are brought into daily contact with Eng. children, and are obliged to learn and speak Eng., where every step is taken to suppress vagrancy, the denationalisation of the G. and their assimilation with the land of their adoption must gradually take place.

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Gypsum, hydrated calcium sulphate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), which occurs in large monoclinic crystals sometimes known as selenite. Marggraf in 1750 showed that *gypsum artefactum*, obtained from sulphuric acid and lime, was identical with the naturally-occurring mineral. When G. is heated to 120° a hemihydrate, $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$, is obtained, and on further heating the anhydrous calcium sulphate results. In this state the product is almost insoluble in water, and is identical with natural anhydrite. Another modification, soluble anhydrite, is obtained from G. by dehydration *in vacuo* over phosphoric anhydrite. When G. is heated moderately there results a product known as plaster of Paris (G. was formerly worked in Montmartre, to the N. of Paris), which, according to Le Chatelier, consists mainly of the hemihydrate above mentioned. On addition of water this dissolves in part, forming a saturated solution which is, however, supersaturated with respect to the dihydrate, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. Consequently some of the dissolved salt separates as G., and the solution can then dissolve more of the soluble form. By repetition of this process all the hemihydrate is converted into G., which separates in interlacing crystals, forming a solid mass. In the original burning of the G. care must be taken that too great heat is not applied, otherwise the product refuses to take up water at all, or at least very slowly. In this state it is said to be 'dead-burnt.'

Gyroscope and Gyrostat, mechanical instruments used to illustrate the curious principles of rotating bodies. The ordinary form of gyroscope (Fig. 1) consists of a heavy wheel A mounted

on an axis BC, which is fixed in a ring BDCE. This ring in turn is capable of rotation about the axis DE, which is fixed in another ring also capable of rotation about the axis FG. The instrument is supported by a heavy stand. The whole is arranged so that the three axes of rotation in any position pass through a fixed point, which is the centre of gravity of the wheel. The wheel is thus capable of rotation about three mutually perpendicular axes, and its axis may thus take up any direction. If the wheel is rotated rapidly, it is found that a very considerable push is required to change the direction of the axis of rotation.

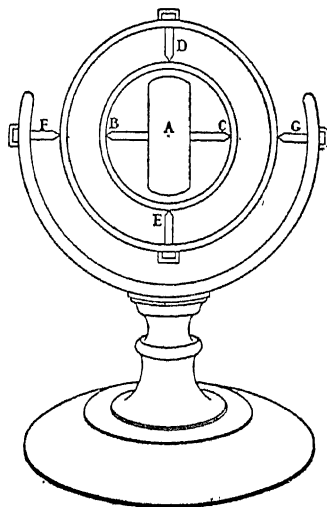


FIG. 1

In the absence of any external forces, the rotating axis will preserve a fixed direction in space. This was used originally by Foucault to prove the rotation of the earth. Thus, if the axis is initially pointed to some star and the wheel kept rotating rapidly, the axis will remain pointing at the star irrespective of the earth's rotation. Thus it will appear to an observer to turn about an axis parallel to the axis of the earth, and follow the star as it rises and sets. It is on this principle that the G. compass is made. So long as the rotation of the wheel can be kept up, the axis, if originally pointed to the pole star, will remain in that direction. By means of several rapidly rotating wheels a telescope

stand has been constructed which will remain fixed irrespective of the motion of a ship. Perhaps the most important practical application of the theory is seen in the torpedo. It is of immense importance that the original direction should be kept after the torpedo has been fired, and so the steering gear is connected with a G. by means of a slide valve. The wheel is set rotating very rapidly at the moment of fire, and the axis of rota-

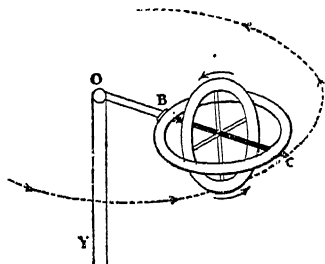


FIG. 2

tion remains fixed in direction. Thus if the torpedo shows any deviation in course, the connection between the rudder and the G. at once produces a steadying effect. So long as the rotation remains very rapid, it is found that the general line of fire is accurately kept. The G. has also been applied to the mono-rail by Louis Brennan, an English inventor, the stability of the train being secured by two gyroscopic wheels revolving in vacuo at a high speed. A more simple form of the G. is sold as a toy. It consists of a wheel set on an axis in a ring, like the wheel A and the ring BDCE in Fig. 1. This ring is fixed on an axis in the same straight line as BC, the end of which fits into a small cup on the top of a stand provided. In Fig. 2, let O represent the cup, and let CBO be the position of the axis as it is placed in the cup after the wheel has been rapidly rotated. It is found that the whole instrument revolves about the vertical axis OY, the end C gradually dropping lower and lower as the rotation of the wheel gradually dies away. This turning about the axis OY is known as *precession*. Another motion of an oscillatory character, known as *nutation*, also exists, but this is so small as often to be hardly perceptible. The reason for precession may be seen from the following: Let ABCD be a wheel rotating about an axis through O perpendicular to the plane of the paper, and also turn-

ing about the axis BD. Let any particle of mass m move in the circle from P to Q in a short time τ . Then if ω_1 is the angular velocity of the wheel, $PQ = \omega_1\tau$. If ω_2 is the angular velocity about BD, P is also moving up out of the plane of the paper with velocity $\omega_2.PM$ when PM is the perpendicular on BD. At Q the velocity out of the plane of the paper has increased to $\omega_2.QN$, i.e. it has increased by $\omega_2.QL$. PQ may be considered a straight line since the time τ is very small, and its length is $OP.\omega_1\tau$. Hence this increase of velocity = $\omega_2.PQ \cos \theta = \omega_2.OP.\omega_1\tau \cos \theta = \omega_1\omega_2\tau.OM$. Hence the momentum of the particle upwards out of the plane increases at the rate $m\omega_1\omega_2.OM$, i.e. proportional to its distance from AC. It must, therefore, be acted upon by a force $m\omega_1\omega_2.OM$ upwards out of the plane of the paper. Similarly, particles on the arc AB are acted upon by an upward force, whilst those on AD and DC are acted upon by a similar downward force. Thus the rotation about BD is due to a couple which would turn the wheel, when not rotating, about the axis AC. Generally, the effect of a couple on a rapidly spinning wheel is to produce displacement of the axis of rotation perpendicular to the plane of the couple. Hence in Fig. 2 the effect of the force of gravity and the support at O results in a

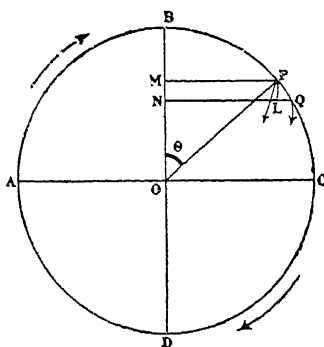


FIG. 3

turning about a vertical axis. Though the terms G. and gyrost are often used for one another, the distinction usually made is that the gyroscopic flywheel rotates about an axis, of which one point is fixed, whilst the gyrost is free to move on a plane. The common model of a gyrost consists of a flywheel enclosed in a case,

slits being left for the string to set the wheel in motion. When the wheel is rotated, the instrument may be placed on a table on its point (in the same straight line as the axis of the wheel) or on any point of the bearing edge (in the plane of the wheel itself, and usually consisting of a regular sixteen-sided figure). In the former case the motion is exactly that of a spinning top, which is the most simple practical form of gyrostat. Other common forms are a hoop, and the two wheels of a bicycle. The general properties of a rotating wheel hold equally well for these cases. Thus the precession of a spinning top, the circular path of a hoop moving with its plane inclined to the vertical, and the turning of the handle-bars of a bicycle to preserve equilibrium, are to be explained by methods similar to that employed in Fig. 3. In the construction of an aeroplane, where the engine wheel and the propeller are rotating rapidly, the gyroscopic effect has to be considered. The

barrels of guns and rifles are fitted with spiral grooves to give the projectile a rapid rotation on its axis, thus tending to keep the direction of the axis unchanged. The rotation of the earth about its axis makes its action very much like that of a top suspended by a string, and corrections for precession and nutation have to be made in astronomical calculations. Many other cases may be quoted.

Gythium, one of the old seaports of Greece, situated on the Gulf of Laconia. The Spartan fleet was stationed here, and consequently, during the time of the wars against Athens, it suffered many vicissitudes. At the present day the larger part of it is sunk in the sea. It is now a modern seaport with a good harbour. Pop. about 5000.

Gyula, the chief tn. of the co. of Békés, Hungary. It carries on a considerable trade in cattle, and manufs. spirits, wine, and oil. Pop. about 22,000.

H

H, the eighth letter of our alphabet as it was of the Phœnician, from which it is derived. It was formerly written **E** or **Ē**, and was called *heth* or *cheth*. Semitic scholars explain that the Phœnicians used it not only as a strong aspirate, which is the modern use, but also as a continuous guttural pronounced like the *ch* in the German *lachen*. The Greeks, of course, borrowed it with the rest of the symbols, and, curiously enough, early made use of it to represent a long *e* sound, *ἦρα*, to distinguish it from the short. Still the right and left halves of the letter were used for smooth and rough breathings, the latter being the aspirate (⋈ and ⋉), so that the *h* passed into the Roman alphabet. Yet by 240 B.C. it was quite neglected by the common people just as it is to-day, so that Catullus pokes fun at Arrius, who tried to be correct, but always succeeded in getting his aspirates in the wrong place, so that he said *hinsidias* for *insidias*, etc. In modern Italian the *h* has quite disappeared, and it is fast becoming obsolete in French. Sometimes it represents other sounds; for example, the Spanish *h* is often a substitute for the Latin *f* (*hijo*, from *filius*), but it is not pronounced. In English it is not infrequently put for *c* and *s*. Thus the prefix *hyper-* corresponds to *super-*; the first syllable of *hex-agon* corresponds with *six*, whilst *hun-dred* and *cen-tury* are real doublets. In English the *h* may be anything from a strong aspirate to a cipher. Thus it is very pronounced in *history*, less so in *when*, and not at all in *hour*.

Haakon, or **Haco** (Old Norse *Hákon*) the name of as many as seven kings of Norway.

Haakon I. (d. 961), called 'the Good,' was brought up as a Christian by Athelstan, King of England, but failed in his efforts to convert his own people from their pagan rites. His foster-father gave him ships in 933, and he sailed home and was soon proclaimed king. The sons of Erik, H.'s half-brother, were constantly rebelling, but H. came off victor.

Haakon IV. (1204-63), called 'the Old,' put to death Earl Skule in 1239, as the latter had become the centre of intrigue. His hold over the Hebrides was secured by a victory at Largs over the Scots. In 1262 the chiefs of Iceland finally acknowledged the suzerainty of Norway's king.

Haakon V., or **Haakon Longlegs** (1299-1319), was the son of Magnus Law Mender, and became king after Eric, his brother. He was the last male descendant of his line. His daughter, Ingeborg, was successfully married to Duke Erik (1312), who, however, was soon starved to death by his father, King Birger of Sweden.

Haakon VII. (b. Aug. 3, 1872), the present king of Norway, was a Danish prince, Charles, second son of Frederick VIII. of Denmark. He married Maud, the youngest daughter of Edward VII. of England; and his only son, Prince Olaf, was b. in 1903. In 1905 Norway separated from Sweden, and in the following year Prince Charles took the ancient name of Haakon and was crowned king.

Haarlem, the chief tn. of the prov. of N. Holland in the Netherlands, is 11 m. distant from Amsterdam. It has a thorough communication to Zandvoort, Leyden, Amsterdam, and Alkmaar by means of electric and steam trams and railways. It presents the appearance of a typical Dutch city, with its long, narrow canals and gable-roofed houses. The principal buildings are situated in the market-place, which is a large space in the centre of the city; here are to be found the Flesher's Hall (built in 1603 and containing the archives), the town hall, the Stadsdoelen, and the Groote Kerk, or Great Church, also called St. Bavon, dating from the close of the fifteenth century. This church has a famous organ consisting of four keyboards, sixty-four registers, and 5000 pipes, and was constructed by Christian Müller. The statue of L. Koster, the founder of the movable printing type, stands in the market-place. Cotton manufacture, dyeing, printing, and type-

founding form the chief industries of H. The city carries on an extensive horticultural trade, rearing the celebrated Dutch bulbs, especially the hyacinth and tulip. H. has played no inconsiderable part in the history of Holland; it took part in the revolt of the Netherlands against the Spanish tyranny in 1572, and was forced to submit to Alva's son, Frederick, in 1573; it owed its final deliverance to William of Orange, who rescued it in 1577. H. is the birthplace of the celebrated Dutch painters, Ostade, Berghem, Ruissdael, and Vanderhelst. Pop. (1926) 111,242.

Haarlem, Lake, or Haarlemmer Meer, in the prov. of N. Holland in the Netherlands, a triangular-shaped expanse of now fertile land reclaimed by dint of unremitting industry in 1840-53 from a sheet of water called Haarlemmer Meer formed by the great inundation of the sixteenth century. It lies between Amsterdam, Haarlem, and Leyden, and has an area of about 72 sq. m. It communicates through the River Y with the Zuider Zee.

Habakkuk, one of the twelve minor prophets of the O.T. Nothing is known of him historically, though legend, as embodied in such works as *The Lives of the Prophets*, has much to say of him. The book bearing his name can be separated into two distinct parts at the end of the second chapter. The third chapter is a psalm ascribed to the prophet H., but which internal evidence shows to be certainly post-exilic. Its text is somewhat corrupt, but not so much so as is that of the first two chapters. In each division valuable emendations have been made by Wellhausen. The problem of the earlier chapters is more difficult. The book opens with a lament to Jehovah (or Yahweh) asking why the iniquity of the wicked is suffered to continue (vv. 2-4), and the prophet receives an answer that Yahweh is about to raise up the Chaldeans as an instrument of vengeance. Then follows another complaint (vv. 12-17) and in chap. ii. 2 comes Yahweh's answer. Then follows the song of triumph of the nations over their oppressor. Many critics hold that the world-power over which the nations should exult is Assyria, and that the difficulties which arise in this interpretation are due to the editors of the fifth or fourth centuries B.C. Others have held that the prophecy was primarily directed against the Chaldeans themselves. The date of the original composition was towards the end of the seventh century B.C. (c. 615). See Commentaries by

Delitsch, Davidson, Nowack, and Driver (*O.T. Lit.*).

Habberton, John (b. 1842), an American author, b. at Brooklyn. He has been successively printer, soldier, merchant, and journalist. From 1865 to 1872 he was connected with Harper Brothers; he was on the editorial staff of the *New York Herald* in 1877, and of *Godley's Magazine* in 1893. His most popular work is *Helen's Babies*, 1876. He has also written: *The Jericho Road*, 1877; *Other People's Children* (new ed. 1903); *Life of George Washington*; *All He Knew*, 1890; *Some Boys' Doings*; *The Tiger and the Insect*, 1902. His play, *Deacon Crankett*, 1880, had a two years' run.

Habeas Corpus, in law, a writ directed to a person having custody of a prisoner commanding him to produce the body (*habeas corpus*) of the prisoner before the court, with a statement of the day and cause of his detention. The personal liberty of the subject has ever in England been the subject of jealous regard, and as early as Magna Charta the principle underlying the writ of H. C. was solemnly enacted. Up to 1679 the constantly recurring acts of repression in the name of the king, notably in the time of the Star Chamber, demonstrated the need for a far more stringent system of procedure. The Petition of Right explicitly demanded that in future the orders of the sovereign were not a sufficient ground for incarcerating his subjects. But after the historic arrest of Jenks in 1676, when the judges decided that a change of prison quarters fully exonerated the prison governor from all liability for failure to produce the prisoner, the famous Habeas Corpus Act of 1679 was passed to meet the new difficulty. Briefly, the Act provides: (1) That a writ of H. C. may be claimed by any prisoner except one committed for treason or felony, the writ to be returnable immediately before the judge granting it with a statement of the cause of the commitment; (2) prisoners committed for treason or felony are to be brought up for trial at the next ensuing assizes, unless the crown witnesses cannot be produced so soon; (3) heavy penalties for shifting the custody of the prisoner from one prison to another without sufficient reason or authority, or for neglecting to give the prisoner a true copy of the warrant of commitment; (4) penalties of £500 for sending persons to prison beyond the seas or re-committing them after delivery by H. C. The flaws in this Act were that there were no safeguards against (a) excessive bail, (b) a false return, or (c) illegal

civil detention. The Bill of Rights remedied (a), and an Act passed in 1816 extended the Act of 1679 to cases of civil detention, and remedied (b) by empowering the judges themselves to examine the truth of the return. The Habeas Corpus Act of 1679 has occasionally been suspended in times of rebellion and civil commotion, e.g. during the Jacobite rebellions of 1714 and 1745, and the agitations excited out of sympathy for the French revolutionaries at the end of the eighteenth century. The writ has been used before now to restrain the rights of a parent over a child, and of a guardian over his ward; and again, the mother of an illegitimate child claim the custody of such a child as against the reputed father by suing out a writ of H. C. On the person detained being produced before a judge, the latter has three courses open to him. He may either make no order at all, discharge the prisoner, or release him on bail.

In the U.S.A. the Federal and State legislatures have founded their procedure on the Act of 1679. The U.S. Constitution provides that 'the privilege of the writ of habeas corpus shall not be suspended unless when, in cases of rebellion or invasion, the public safety may require it.' This question has caused discussion as to whether the right of suspension is vested in the President or in Congress: and some difficulties are caused by the conflict of state and Federal Courts with regard to the right to issue a 'habeas corpus.'

Habere Facias Possessionem, a judicial writ directed to the sheriff commanding him to put the person who has succeeded in an action for the recovery of a chattel interest in land into possession. Chattel interests or chattels real include all leasehold interests or rather interests less than freehold (see ESTATE, FEE, FEE SIMPLE), e.g. tenancy by elegit, tenancies by sufferance (i.e. on expiry of a lease) and at will (i.e. without a specified term of years). The name was often used interchangeably with *habere facias seisinam*, though such use was scientifically inaccurate. The term 'writ of possession' is now the appropriate name for both writs.

Habere Facias Seisinam, a judicial writ directed to the sheriff commanding him to put the recoveror of a freehold interest in lands into possession. In the execution of the writ, as well as of the writ of *habere facias possessionem*, the sheriff may break open doors if the possession be not quietly delivered up (see EXECUTION). Such writ is usually known at the present time as a 'writ of possession' simply. A writ of *fi. fa. (fieri*

facias) for the amount of the mesne profits (rents, etc.) and costs may be joined in the writ for possession.

Habibullah Khan (1871-1919), Amir of Afghanistan, son of Abdur Rahman; assassinated in 1919. He succeeded his father in 1901. Renewed the arrangement with Great Britain by which the control of foreign relations was delegated to the British Government in consideration of protection being given by the latter to the Amir in the event of unprovoked aggression. He continued a loyal friend of Great Britain in spite of blandishments in the shape of German gold and seductive promises. In the capacity of agent to the Indian Government and commercial agent both in India and Great Britain, Habibullah had taken to heart his father's injunction to trust the word of an Englishman, and to rely on British tenacity in any conflict. Thus armed he held out against German emissaries during the Great War, and was more than a match for their propagandist efforts. That his assassination was followed by a rising in Afghanistan and intrigues between the new Amir and the Moscow Soviet (May-June, 1919) is some evidence of the recognition that his loyalty would end only with his death. He was a polyglot of some attainments, and was so far an occidental in taste that he played golf and followed horse-racing, insisted on his courtiers wearing European dress, and limited his wives to three.

Habington, William (1605-54), an English poet, b. at Hendlip, in Worcestershire. He belonged to a Catholic family, and his father and uncle were both implicated in Babington's plot. Having resisted the pressure brought to bear upon him to become a Jesuit, he went to Paris and married Lucy Herbert, daughter of the first Lord Powys, whom he immortalised in *Castara*, 1634, a volume of lyrical poems, some of which are of great sweetness and marked by unusual purity. He also wrote: *Historie of Edward the Fourth*, 1640; *The Queene of Arragon*, 1640, a tragedy-comedy; and *Observations upon Historie*, 1641.

Habit, in physiology. It is well known that every time a certain stimulus gives rise to a specific reflex, the response to the stimulus comes more easily, so that if the cycle is repeated often enough it becomes automatic and even unconscious, and thus a H. is formed. When any nerve ending is stimulated, a current passes along its specific nerve fibre until the spinal cord is reached. In the cord there is a choice of several paths up to the brain, or directly to

Habitual Drunkards, see DRUNKENNESS.

Habsburg, see HAPSBURG.

Hachette, Jean Nicolas Pierre (1769-1834), a Fr. mathematician, b. at Mézières, and educated at the College of Rheims. Through the influence of Gaspard Monge he obtained the post of assistant professor in the newly-established Ecole Polytechnique (1794), becoming professor of descriptive geometry in 1797. In 1816 he lost his chair on the accession of Louis XVIII., and failed to obtain election to the Académie des Sciences owing to royal opposition until after the Revolution in 1831. His chief works are: *Deux Suppléments à la Géométrie descriptive de Monge*, 1811; *Eléments de Géométrie à Trois Dimensions*, 1817; *Traité de Géométrie descriptive*, 1822; *Traité élémentaire des Machines*, 1811.

Hachette and Company, a French house of publishers and booksellers, established in Paris in 1826 by Louis Christophe François H. (1800-64). At first the firm published only a series of books designed to improve the system of school instruction, especially the classics, but in 1850 they extended their publications to include books of almost every type, as well as magazines, a directory-guide to Paris, *Paris Hachette*, and a popular annual.

Hachinohe, a tn. of Japan, situated about 49 m. S.E. by E. of Awamori. Pop. 10,600.

Hachioji, a tn. of Hondo, Japan. 30 m. W. of Tokyo, with an extensive silk industry. Pop. 45,288.

Hackbut, see FIREARMS.

Häkel, Ernst, see HARCKEL.

Hackensack, a tn. of New Jersey, U.S.A., and the cap. of Bergen co. It is situated on the R. Hackensack, 12 m. N. by rail of Jersey City, and 14 m. N.W. of New York, and is served by four lines of railway. It is chiefly a residential town, but in the vicinity are many factories and silk mills. Pop. 24,568.

Hackert, Philipp (1737-1807), a Ger. landscape painter, b. at Prenzlau in Prussia. About 1768 he visited Rome, and passed the rest of his life in Italy. He was commissioned by the Empress Catherine of Russia to paint six pictures of Count Orlov's naval victory over the Turks in 1770. In 1786 he was appointed painter to the King of Naples, but left Naples for Florence in 1799. His paintings, the chief merit of which consists of their close imitation of nature, include, 'View of Rome,' 'Views in the Vicinity of the Villa Horace,' and many seaports of Italy. See Goethe's memoir, *P. Hackert*; *Biographische Skizze*.

Hackländer, Friedrich Wilhelm von (1816-77), a Ger. novelist and dramatist, b. at Burtseid, near Aix-la-Chapelle. He served an apprenticeship to business, and served for some time in the Prussian artillery, but began his literary career with *Bilder aus dem Soldatenleben im Frieden*, 1841. In 1843 he became secretary to the Crown Prince of Württemberg. *Wachstubenabenteuer*, 1845, was followed by *Bilder aus dem Soldatenleben im Kriege*, 1849, the fruits of a campaign in Piedmont. A tour in Spain in 1854 resulted in *Ein Winter in Spanien*, 1855, and in 1857 he founded, with Zoller, the illustrated weekly *Über Land und Meer*. Among his novels the best are, *Namenlose Geschichten*, 1851; *Eugen Stillsfried*, 1852; *Krieg und Frieden*, 1859; and his best comedies are, *Die Geheime Agent*, 1850, and *Magnetische Kuren*, 1851. See H. Morning, *Erinnerung an F. W. Hackländer*, 1878.

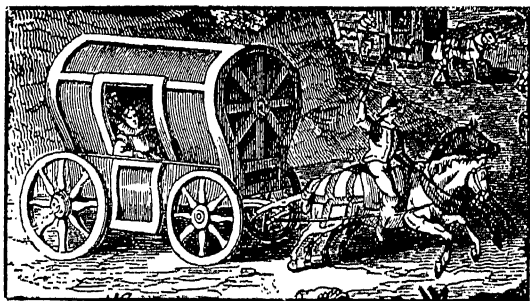
Hackney, a north-eastern metropolitan bor. of London, 3 m. N.N.E. of St. Paul's. The borough is in three divisions (North, Central, and South, each returning one member), and includes Clapton, Homerton, Dalston, and part of Kingsland. The R. Lea flows to the E., and Victoria Park lies partly within the borough limits. The ancient Gothic church of St. Augustine is the only important historic building. H. was once a fashionable place of residence, but is now a poor district. John Howard (d. 1790) and Daniel Defoe (d. 1731) both resided here. Pop. 222,142.

Hackney Carriages are carriages, other than omnibuses, used for the conveyance of passengers, and include motor omnibuses, char-a-bancs, tramway cars, hansoms, four-wheeled cabs, and taxi-cabs. The forerunner of the cab (*cabriolet de place*) was the hackney coach; the hansom cab was invented by J. A. Hansom in 1834. H. C. in London are regulated by a variety of statutes, and regulations may be made by the Home Secretary at his discretion. Every cab must have an annual licence from the Home Secretary, which is issued by the chief commissioner of police. Hackney and stage carriage drivers, before obtaining a licence, are required to pass a test as to their ability to drive, and H. C. drivers, in addition, must pass an exam. as to their knowledge of town, i.e. an exam. extending to a knowledge of the chief squares, hospitals, streets, etc. It must have the number of persons it is licensed to carry painted on the back, and must bear a light from one hour after sunset to one hour before sunrise. The hiring of a cab may be by time or distance, but no driver is com-

pelled to go for more than 6 m. or longer than one hour. (See also CABS.)

Hackney Coach (Fr. *haquenée*, Lat. *equus*, an ambling horse or mare, kept especially for the use of ladies). From the hiring-out of 'hackneys' the word came to be associated with letting out coaches, etc., for hire. The H. C. was a conveyance with four wheels and two horses let out for hire generally after being discarded by some owner among the nobility. Some authorities derive the name from 'Hackney,' formerly a suburb of London, from which the first hired coaches were accustomed to start.

Lammermuirs (1500 ft.) in the S., and the scattered peaks of Traprain Law (724 ft.), North Berwick Law (612 ft.), and Garleton Hill (590 ft.). The only important river is the Tyne (28 m.). Coal and iron are mined and limestone quarried in various districts, but the chief industries are agricultural, Haddingtonshire having long been famous for the richness of its grain and green crops. Fishing is also largely followed. The county returns one member to parliament. The chief towns are Haddington, Dunbar, North Berwick, and Prestonpans. Area 267 sq. m. Pop. 47,489. See EAST LoTHIAN.



HACKNEY COACH
(From a print dated 1584)

Haddington, a royal municipal and police bor. and the co. tn. of Haddingtonshire, Scotland. It lies on the Tyne, 18 m. E. of Edinburgh. The chief building is the ruined St. Mary's Church, a cruciform decorated building in red sandstone, the nave of which is sufficiently repaired to serve as parish church. Other buildings are the county buildings (1833), the corn exchange (1854), the town hall (1748-1831), and the Knox Memorial Institute (1880). Famous natives of the town were John Knox, John and Samuel Brown, Samuel Smiles (1816-1904). The town has suffered from fires in 1216 and in 1244, floods in 1775, and the great siege of the English by the Scots in 1549. The chief industries are the manufactures of agricultural implements, woollen goods, and sack-ing, and brewing and tanning. Pop. 5325.

Haddingtonshire, or East Lothian, a south-eastern maritime co. of Scotland, bounded by the Firth of Forth and the North Sea, and the counties of Berwick and Edinburgh. Its surface is generally hilly, with the

Haddock, or *Gadus arglefinus*, a species of Gadidae, a family of marine carnivorous fishes; it is found on all coasts in the N. Atlantic Ocean, and is abundant everywhere round Great Britain. There is a strong resemblance between the H. and *G. morrhua*, the cod, both having three dorsal and two anal fins of an elongated form;



HADDOCK

the H. is distinguished by a black lateral line and a black spot behind each of the pectorals. The H. is also smaller, as it never exceeds a length of 3 ft., some of the largest specimens being found in Dublin Bay. Its colouring is brown, and silvery underneath, the black markings on the

pectoralis sometimes extending to the middle of the back; tradition ascribes the origin of these spots to the finger and thumb of St. Peter, and alleges that the H. was the fish from whose mouth he took tribute money. The H. lives largely on molluscs, and the bait used in catching them consists generally of mussels; trawl-nets are also employed in H. fishery. These fish are gregarious and inhabit deep waters, travelling to the coast to spawn during March and April. They are sometimes cured by salting, but the usual method is to dry and smoke them; the familiar Finnan H. is so named after the fishing village of Findon, Kincardineshire.

Haddon Hall, one of the most famous old English baronial mansions, stands on the R. Wye, 2 m. S.E. of Bakewell in Derbyshire, and 23 m. N.N.W. of Derby. The styles of the architecture range from the Norman to the sixteenth and seventeenth centuries. Before the Conquest it was the property of the crown, but William I. granted it to William Peveril. It has been successively in the families of Avenell, Vernon, and Rutland. It is referred to by Scott in *Peveril of the Peak*. See S. Rayner, *History and Antiquities of Haddon Hall*, 1836; G. Le Blanc Smith, *Haddon, the Manor, its Hall, its Lords and Traditions*, 1906.

Haden, Sir Francis Seymour (1818-1910), surgeon and painter-etcher; b. Sept. 16 in Sloan St., London; son of Chas. Thos. H., M.D. Educated: University College, London; medical schools, Paris and Grenoble. Honorary surgeon, Department of Science and Art, 1851-67. F.R.C.S., 1857. Attended Thackeray in last illness. For etching, received Grand Prix de Paris, 1889, 1900. Brother-in-law to Whistler. Knighted 1894. Died at Woodcote Park, Bramdean, Hants., June 1.

Hadersleben, or Haderslev, a seaport and tn. of Denmark, in Schleswig-Holstein, situated on the H. Fiord, an inlet communicating with the Little Belt. A considerable export trade is carried on in grain, seeds, hides, etc., and among the industries are iron foundries, engineering works, tanneries, and tobacco factories. Pop. 13,000.

Hades, in Gk. mythology, was the name applied to the kingdom of the underworld, the place of the departed spirits or shades. It is the Gk. translation of the Hebrew *sheol*, which is frequently referred to in the N.T. H. was also the personal name of the king of the underworld, Dis or Pluto (*q.v.*), who is sometimes represented as seated on a throne of sulphur from which issued the

streams of Lethe, Cocytus, Phlegethon, and Acheron, which traversed the kingdom of the dead. For the legend of Dis's rape of Persephone, see PROSERPINE.

Hadfield, a par. and vil. of Derbyshire, England, on the Cheshire border, 2 m. N.W. of Glossop. The cotton industry is carried on. In the Catholic church are some noted pictures, including a 'Transfiguration' by Raphael. Pop. 5954.

Hading, Jane, stage name of Jeanne Alfrédine Tréfourret, b. 1859 at Marseilles. The daughter of an actor, she appeared on the stage first as an infant of three. After training in the Marseilles Conservatoire, she obtained an engagement in 1873 for the theatre at Algiers. From there she went to Cairo; and, her voice having attracted attention, she returned to Marseilles and sang in operetta. She made her appearance in Paris at the Palais Royale in *La Chaste Suzanne*, and in 1883 made a great hit at the Gymnase in *Le Maître de Forges*. She married the manager of the theatre, Victor Koning, in the following year, but divorced him in 1887. In 1888 she toured America with Coquelin, and on her return played at the Vaudeville in London with great success.

Hadj, or Hajj, the Arabic word, meaning literally 'a setting out,' is used for the greater pilgrimage of Mohammedans to Mecca which takes place from the eighth to the tenth of the twelfth month of the Mohammedan year, and which every Mohammedan whose wealth and health will permit of it must perform once at least in his lifetime. The term is used more loosely to include the 'umrah' or lesser pilgrimage to Mecca, a Mohammedan's pilgrimage to any shrine or sacred place, and also to the pilgrimages of Eastern Christians to Jerusalem. The title of Hadji is given to all Mohammedans who have performed the greater pilgrimage. See MECCA and MOHAMMEDANISM.

Hadleigh, a tn. in the co. of Suffolk, England, situated 9½ m. W.S.W. of Ipswich. It is a very old-fashioned and old-world town, and contains many quaint houses. It is chiefly noted for the possession of a very fine church. Pop. 3038.

Hadley, a par. and vil. of Shropshire, England, situated in the Wellington div., 10 m. E. of Shrewsbury. Coal and iron are found, and the works of the Shropshire Iron Company are here. Pop. 3257.

Hadley, Arthur Twining, b. New-haven, Connecticut, U.S.A., April 23, 1856, was the son of a well-known American philologist. He graduated

from Yale University in his home city in 1876, taking first honours in a number of academic subjects. He afterwards pursued a post-graduate course in political science and history in Yale and in the University of Berlin. Returning home he became a tutor in Yale from 1879 to 1883, and then served for three years as an instructor in political science. In 1886 he was made professor of that subject, serving until 1891, when he was made Professor of Political Economy, and served until 1899, when he was honoured by being made President of his Alma Mater. He retired in 1921. H. made a special study of railway subjects, embodying the results in his standard work *Railroad Transportation, Its History and Laws*, published in 1885. For a short period in 1907-8 he returned to the University of Berlin, where he became Theodore Roosevelt Professor of American History. Among his other books are *Economics*, 1896; *The Education of the American Citizen*, 1901, and *Economic Problems of Democracy*, 1923.

Hadley, James (1821-72), an American philologist, *b.* at Fairfield, Herkimer co., New York. An accident in childhood made him lame for life. He graduated at Yale (1842), and took up the study of Sanskrit under Edward Elbridge Salisbury, which resulted in his turning his attention to languages. He knew Gk., Latin, Sanskrit, Hebrew, Arabic, and Armenian, in addition to all the modern European languages and several Celtic languages. He was professor of Gk. at Yale from 1851 until his death. He published a *Greek Grammar*, 1860 (revised 1884), and wrote an essay on the 'History of the English Language' for Webster's *Dictionary*. See sketch by his son A. T. Hadley in *Biographical Memoirs of the National Academy of Sciences*, vol. v., 1905, pp. 247-54.

Hadley, John (1682-1744), an Eng. mathematician and mechanician. He greatly improved the reflecting telescope, and in 1731 he invented a reflecting quadrant or sextant. His claim to the invention was disputed, a glazier in Philadelphia named Thomas Godfrey (1704-49) having invented a similar instrument, but it was satisfactorily proved that each had worked independently.

Hadow, Sir (William) Henry, Eng. musician and scholar; *b.* Dec. 27, 1859, at Ebrington, Glos.; eldest son of Rev. Wm. Elliot H. Educated: Malvern; Worcester College, Oxford. Formerly fellow, Worcester College; examiner in languages at different periods between 1900 and 1909. Occupied educational posts with

troops during Great War. Knighted, 1918. Hon. D.Mus.: Oxford, Durham, Wales.

Hadramaut, or **Hadramut**, a dist. on the S. coast of Arabia, bounded W. by Yemen, E. by Oman, and N. by the Dehna desert; modern Arab geographers restrict the name to the district between 48° and 51° E. It consists of a plateau, cut into deep ravines, between a strip of coastland and the range of hills which bound the interior desert. The climate is dry but healthy, the inhabitants mainly of S. Arabian stock, and the chief pursuits agriculture, cattle-breeding, date, indigo, and tobacco cultivation. The chief towns are Shibam, Saiyun, Tariba, and Terim. It is under British protection and control. Pop. (estimated) 150,000. See L. Van der Berg, *Le Hadramut et les Colonies arabes*, 1885; J. T. Bent, *Southern Arabia*, 1895.

Hadrianopolis, see **ADRIANOPLE**.

Hadrian's Villa, near Tivoli (Tibur), Italy, about 17 m. E.N.E. of Rome, a country residence of the Emperor Hadrian, a magnificent building with gardens, temples, a palace, theatres, and a stadium, all miniatures of the most celebrated places in the provinces, and filled with art treasures.

Hadrian's Wall, the name generally given to the remains of the Rom. fortification stretching from Wallsend on the Tyne to Bowness on the Solway, probably built by command of the Emperor Hadrian in A.D. 122 as a turf wall. It was repaired and partly rebuilt in stone by Septimus Severus in A.D. 209. The fortification consists of (1) a stone wall to the N. with a ditch on its N. side to act both as a barrier against the Caledonian tribes and as a line of military strategy; (2) a series of forts, block-houses, and towers along the rampart; (3) an earthwork to the S., fenced with stakes, and called the Vallum, of uncertain use. The total length of the Wall, from one coast to the other, is 73½ m.; its greatest width is 9½ ft. on a foundation 10½ ft. wide, but in some places, in order to economise material, the builders had reduced the width to 7½ ft. Since 1922 a great many excavations have been made, bringing to light many new treasures and inscriptions of archaeological interest. In 1924 it was taken under the authority of the Office of Works, which now affords it a much-needed protection against vandalism and sees to the preservation of the ruins. John Clayton (1792-1890) made a magnificent collection of antiquities found in the Rom. Wall, and in 1895 his nephew stored them in a small and exquisitely-arranged museum at Chesters (anct.

Cilurnum); his great-grand-nephew, John Maurice Clayton, presented the collection to the nation under a body of trustees. The museum contains over 300 inscribed or sculptured stones; a collection of jewellery, household and toilet implements, votive offerings, sculptures, inscribed altars, objects in bronze and pottery, a reproduction of the 'Chesters Diploma'—a bronze tablet of the year A.D. 146 officially giving a soldier his discharge and full rights of Roman citizenship; the original was presented by John Clayton to the British Museum. See J. C. Bruce's *The Roman Wall* (3rd ed. 1867); F. G. Collingwood's *Guide to the Rom. Wall*, 1926, and his *Archæology of Roman Britain*, 1930; J. Mothersole's *Illustrated Hadrian's Wall*, 4th ed., 1929.

Hadrianus, Publius Ælius (A.D. 76-138), generally called Hadrian, Emperor of Rome, A.D. 117-38. In A.D. 85 or 86 he was placed under the guardianship of Ulpian Trajanus (afterwards the Emperor Trajan) at Rome. He held various public offices in Rome; distinguished himself in the Dacian campaigns; was 'legatus pretorius' of Lower Pannonia in 108, 'legatus' in the Parthian campaign (113-7). When the emperor fell ill in the East, he formally adopted Hadrian as his successor and left him as commander in Syria. Hadrian was proclaimed emperor on Aug. 11, 117, and promptly proceeded to simplify the difficulties which besieged him at home and abroad by adopting a peaceful policy. He made peace with the Parthians, abandoning Mesopotamia and Assyria to them; appeased the Roxolani who had invaded Mesia, and sent Marcus Turbo to pacify Mauritania. In 118 he hastened back to Rome to remove the unfavourable impression produced by the execution of some conspirators who had plotted his assassination. In 119 he began his celebrated travels through the empire, visiting Gaul, Germany, Britain, Spain, Mauritania, and Egypt. From 125-6 he was in Athens; in 130 on the Nile where he lost his beloved Antinous; in 134 he returned to Rome and passed the remainder of his life between the capital and his beautiful villa at Tibur. Hadrian was a capable and just ruler, and, except during his last illness, when he was subject to fits of violent cruelty and severity, succeeded in endearing himself to his subjects, and at the same time remaining a strict disciplinarian. He introduced various constitutional reforms at Rome, and was a patron of poets and scholars, while his magnificent buildings, especially in Athens and Rome, have been the admiration of succeeding

centuries. See Gregorovius' *The Emperor Hadrian* (Eng. trans. 1898).

Haeckel, Ernst Heinrich (1834-1919), a Ger. biologist, b. at Potsdam. He studied medicine and science at Würzburg, Berlin, and Vienna under Müller, Virchow, and Kölliker. He began to lecture at the University of Jena in 1861, and was professor of zoology there from 1862-1909, with short intervals spent in travelling in search of zoological specimens. He is equally famous for his detailed zoological researches and for his generalisations on biological themes. In the former he has confined himself mainly to the Invertebrata, and has published *Die Radiolarien*, 1862; *Die Kalkschwämme*, 1872, on calcareous sponges; *Das System der Medusen*, 1879-81, on jelly-fishes, and numerous smaller works, as well as his contributions to the *Challenger* reports—on *Deep-sea Medusa* (1882), on *Siphonophora Keratosa*, and *Radiolaria* (1889), all beautifully illustrated with superb plates which show the author's supreme skill in draughtsmanship. In the work of generalisation in biology his greatest achievement is *Generelle Morphologie* (2 vols.), 1866, a treatise on animal morphology in the two sections of tectology and promorphology, much of which he subsequently re-wrote in his *Natural History of Creation*, 1868. H. was one of the first to attempt to draw up a genealogical tree (Stammbaum) exhibiting the relationship between the various orders of animals with regard both to one another and their common origin, and his theory that the life history of the individual is more or less a recapitulation of its historic evolution, embodied in his *Studies on the Gastræa Theory*, 1873-84, has been generally accepted as the basis of all modern zoological classifications. H.'s more popular works are very brilliantly written, but he is not always so careful in statement as Darwin, while his monist theories result in a materialistic tendency in his writings. His most notable treatise is *Natürliche Schöpfungsgeschichte* ('Natural History of Creation'), in which he divides the whole animal creation into two categories—the Protozoa, unicellular, and Metozoa, multicellular animals—the former remaining throughout their existence single-celled, while the latter were built up of cells innumerable. Of these studies the most striking outcome was the 'stem' of the human race, in which he traced the descent of man through six-and-twenty stages from Monera, that is simple structureless masses of protoplasm, up to the chimpanzee, and 'Pithecanthropus erectus,' human remains discovered in Java, which

he held to be the missing links between primitive man and the manlike apes. (See ANTHROPOLOGY.) When Darwin published his 'Descent of Man' in 1871 he observed that Haeckel in his 'Natural History of Creation' had fully discussed man's genealogy, and said that 'had this work appeared before his own essay he should probably never have completed it. Almost all the conclusions at which he (Darwin) had arrived, he found confirmed by this naturalist, whose knowledge on many points was much fuller than his. On the controversial subject of the inheritance (see HEREDITY, WEISMANN) of acquired characters, H.'s conclusions agreed with those of Lamarck and Darwin, that the hereditary transmission of acquired characters was one of the most important phenomena in biology, that it was proved by thousands of morphological and physiological experiences, and was an indispensable foundation of the theory of evolution. In support of this view, H. refers to the inheritance of rudimentary organs, which once were serviceable in 'our simian ancestors,' but are now utterly useless or even injurious—as, for example, the appendix, the frequent disease of which is the cause of appendicitis. But this illustration misses the point at issue. The inheritance of useless rudimentary organs is admitted; it is the inheritance of acquired characters which is denied by many modern biologists—whether these qualities be useful or ornamental. Sir Francis Darwin has adhered to his father's views, as did Herbert Spencer to the end; that view being that if parents acquired any useful characteristic their offspring would generally inherit it; but the majority of British biologists probably agree with Weismann, whose famous germplasm theory is to the effect that only those characters can be transmitted that were contained in rudimentary form in the embryo. H.'s reputation as a monistic philosopher is much less secure than his reputation as a biologist. In importing his evolutionary theories into the realms of philosophy, morals, and religion, he advanced propositions in physics which no physicist would admit and which only betray his limited acquaintance with the subject. His *Die Welträtsel* (transl. into English as *The Riddle of the Universe*), which enjoyed wide popularity among English readers, contains theses on the 'monistic view of substance' which have been summarily dismissed by the spiritualist Sir Oliver Lodge (*Life and Matter*) as mere nonsense; yet H.'s book is padded

with quaint theses on the fundamental forms of substance on which H. believed that he had proved that there was no immortal soul, or free will, or personal God. Even in questions of natural history, when he attempts to philosophise, he writes with a like crudeness. Yet H. really thought his Monism a very essential part of his work. This theory of Monism was, however, by no means novel. Plotinus, Spinoza, Berkeley, Hegel and Schopenhauer were all, each in his way, Monists. Where men have denied mind and have denied matter, H. conjectured 'substance' as the foundation of both—which is only materialism 'dignified with a higher title.' (Consult on this Herbert Spencer's *Synthetic Philosophy*.) But while H. the monist will be forgotten, H. the naturalist will live. At the outbreak of the Great War in 1914 H. joined in denunciations of England, evidently oblivious to the fact that in former days he had held up Britain as Germany's model. His *Anthropogenie*, 1874 (translated into English as *The Evolution of Man*, 1879), and his *Lectures on Development and Evolution*, 1878–9, are very widely read. Extending his theory of evolution from zoological subjects, H. applied it to problems of philosophy and religion, embodied in *Die Welträtsel*, 1899 (Eng. trans. *The Riddle of the Universe*, 1901); *Die Lebenswunder*, 1904 (Eng. trans. 1904). His other works include: *Ursprung des Menschen*, 1898 (Eng. trans. *The Last Link*, 1899); *Insulinde*, 1901; *Wanderbilder*, 1905; *Das Menschenproblem und die Herrentiere*, 1907; *Das Weltbild von Darwin und Lamarck*, 1909. See *Biography* by Bölsche (in German), 1900, and by McCabe (in English), 1906.

Hæmatite, or **Hematite**, diferric trioxide (Fe_2O_3), obtains its common name in allusion to its usual colour. In its crystalline condition it may be almost black, but even then its characteristic blood-colour is given on the streak plate. It crystallises in the rhombohedral system, and is isomorphous with corundum. *Elba iron ore* or *H.* from Rio Marina often possesses a brilliant metallic lustre which may be iridescent; this particular form receives the name of *specular iron ore*, and has a hardness of 6, and sp. gr. of 5.2. Recent volcanic rocks, as lavas of Auvergne, Eifel, etc., sometimes contain small thin scales of specular ore (*micaceous iron ore*). One form of micaceous iron ore is worked in Devonshire under the name of *shining ore*. *H.* may also exist in fibrous or granular conditions, and an impure earthy form, *red ochre*, is an economic product. The hard fibrous form from

Spain is used by bookbinders, goldsmiths, and others as a burnisher. In the N. of England fibrous H. often occurs in concrectionary masses, it then receives the name of *kidney ore*, in recognition of its appearance on fracture. H. is widely distributed, and has been known since very remote days, having been occasionally cut and polished as an ornamental stone by the Assyrians, etc. The modern use of the mineral is as an ore of iron, and being remarkably free from phosphorus it is particularly suitable for the manufacture of steel. Analyses of certain specimens have closely approached the theoretical 70 per cent. of iron for this oxide. Important mines occur in Elba, Spain (Bilbao) and Scandinavia on the Continent. Large deposits also occur near Lake Superior. In Britain the chief supplies are in W. Cumberland and N. Lancashire. Apart from the uses mentioned above, ground H. is used largely in paint manufacture.

Hæmatomesis, blood vomiting, from changes originating in the stomach wall, as in cases of ulcer, the result of long-continued dyspepsia. The hæmorrhage may be sudden and unexpected in cases in which the dyspepsia has lasted so long that individuals regard it as their normal condition, to which they have become accustomed. H., however, may also occur suddenly and unexpectedly on account of liver trouble.

Treatment.—Until the bleeding has ceased, and its cause has been certainly decided upon, it is inadvisable to take anything, bite or sup, but to remain absolutely at rest, sucking pieces of ice and spitting out the water. In this way the thirst is relieved, but care should be taken to prevent anything whatever entering the stomach.

Hæmatoxylin, a colouring extracted from logwood (*Hæmatoxylon campeachianum*). Its chemical formula is $C_{16}H_4O_6$, and is in itself a crystalline substance and nearly colourless, but when combined with oxygen becomes a reddish colour, forming a substance known as hæmatestin. H. is used for dyeing, principally to produce blue and black colourings.

Hæmatozoa (literally, a blood animal), worms of the genus *Filaria* that inhabit the blood. In humans, these animals only breed in the tropics. They cause the legs to swell until they attain a considerable size and have the straight up-and-down appearance of an elephant's legs. Hence the condition is known as elephantiasis. Various other symptoms are produced, but these are less characteristic than the appearance

under the microscope of the worms in the blood.

Hæmaturia, blood in the urine. This may come from the urethra or bladder, from injury, ulceration, or tumours. It may occur as simply trickling or preceding the voidance of urine, as clots, or oozing at the end of the act. It may be derived from the kidney, when it causes a smoky colour, or it may be in such minute quantities that it can only be detected by the microscope, or by chemical tests. Blood from the kidneys is found as a complication in various diseases originating in the kidneys, and also in fevers and general diseases. Other causes of H. are stones in the bladder or kidneys, rupture of vessels in these parts or, at and after middle life, of the prostate. It occurs in tubercle, in which, however, it is usually a late symptom, and also appears in inflammation of the bladder. When, on account of clots, or from other cause, there is pain, the application of heat, by fomentations or hip baths, is indicated.

Hæmoglobin, a protein occurring in the red blood-corpuscles which possesses the property of combining with oxygen and again yielding up the same when the concentration of oxygen sinks below a certain amount (see BLOOD). H. gives a definite absorption spectrum which is quite different from that of oxyhæmoglobin (the oxygenated product). In colour it is purplish-red, whilst oxyhæmoglobin is bright red. This difference in colour may be noticed by comparing venous and arterial blood. H. also has the power of combining with carbon monoxide, giving a compound which has a much brighter red colour than oxyhæmoglobin. The poisonous character of carbon monoxide is due to this property of forming with H. a more stable compound than oxyhæmoglobin; H. is easily decomposed into a pigment hæmatin which contains iron, and a proteid globin which seems to belong to the group of histones. Hæmatin has the formula $C_{24}H_{20}N_4O_4FeOH$, and is chemically related to chlorophyll, the green colouring-matter of plants.

Hæmophilia, literally, a tendency to blood. This is also known as the hæmorrhagic diathesis. Patients suffering from this are known as 'Bleeders.' H. is a condition in which the blood clots very slowly, and consequently, from the slightest injury, hæmorrhage persists for some considerable time, and even the smallest wound may be fatal. The condition is of great interest, as it is distinctly hereditary, being inherited by women, but most common in men. Tooth

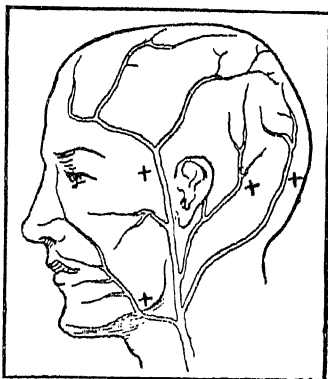
drawing and other operations are much dreaded by dentists and surgeons, as, except for the tendency to bleed, there is no other sign or indication of disease. The bleeding may be internal, under the skin, when the slightest injury causes extensive discoloured bruises. In joints slight injuries result in bleeding into them, so that they swell to considerable size and become useless. A fall on the head may result in bleeding in the brain, which may be fatal. A popular fallacy that a bleeder has a skin too little originated in the official statement that this was what a distinguished personage, with this disease, was suffering from.

Hæmoptysis, spitting of blood, that is, hæmorrhage from the lungs or air passages; a common, if not the most frequent, cause of tuberculosis, of which it is often the first symptom. It has consequently come to be unduly feared, because looked upon as identical with consumption, whereas it may be beneficial as an indication of a condition which, when treated early, results in complete recovery and the restoration of good health. On the other hand, in the course of consumption, unexpected bleeding may occur and cause death by choking. The main lines of the treatment of H. are: To keep the patient absolutely flat on the back, with perfect rest of mind and body. Warm drinks should be avoided and all food taken cold, or even nothing taken at all, except sucking small pieces of ice.

Hæmorrhage, bleeding. This may occur from an artery, when the blood spurts out in jets synchronous with the pulse beat and contraction of the heart. From a vein the blood is scarlet and flows in a continuous steady stream. Oozing, or capillary bleeding, is intermediate in tint between the two former ones. It is more readily controlled than the others, though in a place where the bleeding spot cannot be reached, as in the nose, it may continue for a considerable time. The main art of the surgeon is to perform an operation with as little bleeding as possible and to control the H. in cases of injury. Thus, to fully discuss bleeding would be to write a treatise on surgery. The main points, however, are: To apply pressure on the bleeding spot; this is usually sufficient in a case of oozing, such as occurs in small cuts, when no large vessels are severed. In venous bleeding, the parts should be raised. In cases of arterial bleeding, pressure should be applied in the course of the artery between the wound and the heart, or a bandage tied round the part sufficiently tightly to check the H.

Hæmorrhoids, see PILES.

Haffkine, Waldemar Mordecai Wolff, bacteriologist: b. March 15, 1860, at Odessa, of Jewish race; became a pupil of Pasteur; held for some time the post of Professor of Physiology at the Geneva Medical School. From there he went to India, where he was made director-in-chief of the gov. laboratory at Bombay. He was the first to produce a vaccine for the treatment of cholera, his first inoculation being made at Agra in 1893. Four years later he introduced a fluid for inoculation against plague. He was later appointed bacteriologist to the Indian Gov., but has now retired and lives at Boulogne.



HÆMORRHAGE

Diagram showing points where arteries can be compressed in the head

Haffs (Danish *hav*, sea), the term applied to lagoons in the Baltic Sea. These lagoons are separated from the sea by *nehrungs*—strips of sand. The chief ones are Pommersches or Stettiner Haff, Frisches Haff (50 m. long and over 10 ft. deep), and Kurisches Haff (60 m. long).

Hafiz, the *nom-de-plume* of Khwāja Shamsuddin Mohammad, the greatest Persian lyric poet, 'the most Persian of the Persians' (Nitzgerald). The date of his birth is doubtful; his death is variously given as 1388, 1391, and 1394. Little is known of his life except that it was mainly spent in Shiraz under the successive patronage of the governor Shah Isḥāk, Shah Shujā, and the vizier Kawāmuḍdin, at whose college he lectured on the Koran; of this his knowledge was unrivalled, and he is credited with having written a great commentary.

His verses, which reveal an extraordinarily brilliant technical accomplishment, are expressed in terms of typical oriental hedonism—wine, roses, and lovely maidens; he has been called the Anacreon of Persia. But his writings had a deeper mystic significance, and expressed symbolically the religious idealism of the Sufis (q.v.). H. was apparently a Sufi by training, and a realist by temperament. The famous *Diwân*, a series of ghazals collected by one of his pupils, is his best-known work, but no satisfactory complete translation has yet appeared. The most important European study of H. was written late in the seventeenth century by a Bosnian, Sudi. Eng. translations are: Robinson (1875), Love (1877), and Sir Wm. Ouseley (1797–98); Cowell's translation of the Odes (1854); and Abdul Majid and Cranmer Byng's *Rubaiyat* (Murray's Wisdom of the East series, 1910).

Hafnium, a metallic element of symbol Hf, atomic number 72 and atomic weight 178.6. It was discovered by the Danish chemists Coster and Hevesy, and is closely related to the element zirconium; zirconium ores almost always contain small amounts of hafnium compounds. Commercial applications of the element in electric lamps and X-ray tubes are forecast.

Hagar (Gen. xvi.), an Egyptian slave of Sarai, the wife of Abraham. She was evidently the companion as well as the servant of Sarai, and at the latter's wish became the concubine of Abraham, to whom she bore a son, Ishmael. Motives of jealousy then led Sarai to drive her out into the wilderness, where she received the oracle as to the future fate of the Ishmaelites.

Hagberry, see BIRD CHERRY.

Hagelberg, a vil. in the prov. of Brandenburg, Prussia, 22 m. S.W. of Potsdam. Noted historically for the victory obtained by the allies, under Hirschfeld, over the Fr., Aug. 1813.

Hagen, a tn. in the Prussian prov. of Westphalia, Germany, 15 m. N.E. of Elberfeld. It is one of the most flourishing industrial centres of Westphalia, and possesses some fine public buildings, including a technical school with a special engineering branch. There are large iron and steel works, and woollen, cotton, leather, paper, etc., are manufactured; there are also breweries and distilleries. In the neighbourhood there is an alabaster quarry, and limestone is also worked. Pop. 98,690.

Hagen, Johannes Georg, Austrian astronomer; b. March 6, 1847, at Bregenz; son of Martin H., school-

teacher. Educated: Gymnasium Feldkirch; Universities of Münster and Bonn. Studied theology in England, 1875–80. Became Jesuit. Taught mathematics and physics at Prairie du Chien, Wisconsin, 1880–88. Director Georgetown University Observatory, D.C., 1888–1906. Was then called to take charge of Vatican Observatory, Rome. Pub. works in Latin and Ger.

Hagen, Walter (b. 1894), American golf champion, b. at Rochester, U.S.A. Began playing golf as a boy, early showing great aptitude for the game. Won U.S.A. Open Golf Championship in 1914 and again in 1919. Won the British Open Golf Championship in 1922, 1924 and 1928, and the Belgian Open Championship in 1924, in which year he also won the Professional Championship, U.S.A.

Hagenau, a tn. of France in the dept. of Bas-Rhin. It is about 16 m. N. of Strassburg in the middle of the Hagenau Forest. It possesses two fine old churches dating from the twelfth and thirteenth centuries, besides other public buildings. The main industries are wool and cotton spinning; boots, soap, wine, and oil are manufactured; and there are also breweries and potteries. It is a garrison town and dates from the twelfth century, when the dukes of Swabia had a hunting-lodge there. In 1154 the Emperor Frederick I. gave it town rights and built walls round it, and an imperial palace. In 1257 Richard of Cornwall, King of the Romans, made it an imperial city. Later it fell into the hands of the Fr., passing into the possession of Germany, 1871. By the Treaty of Versailles, 1919, it passed back once more into the possession of France. Pop. about 13,500.

Hagerstown, a city and the co. seat of Washington co., Maryland, U.S.A., about 86 m. by rail N.W. of Baltimore. It is situated in a valley overlooked by the N. and S. Mountains, and contains the Kee Mar College (1852) for women. It is a large manufacturing centre, flour, shirts, automobiles, agricultural implements, etc., being some of its products. Pop. 30,861.

Hag-fish, or Borer, the name applied to all members of the Myxiniidae, marine fishes belonging to the Cyclostomata; they occur off all the coasts of W. Europe and off the E. American coast as far as Cape Cod. Their bodies are eel-shaped, with no lateral fins, and a slight median fin at the extremity; the head is equipped with four pairs of sharp tentacles, with which the H. attack cod, haddock, etc., devouring all the flesh and leaving only the skeleton of

their prey. Shoals of fish are often destroyed by the various species of *Myxine* which, when not seeking food, lives in mud-beds at the bottom of the sea; *M. glutinosa* and other species secrete a thick glutinous slime. *Eddelostoma* contains two species which occur in the S. Pacific.

Haggai (either 'born on a feast-day' or 'feast of Yahweh'), a prophet contemporary with Zechariah whose prophecies are contained in the book of the O.T. which bears his name. Little is known about the prophet himself, but from chap. ii. 3 of his work we may gather that he was already an old man when he began to prophesy, being one of those who had seen the temple 'in its former glory.' His book contains four short prophecies all delivered in the latter part of the second year of Darius the king (520 B.C.), the first three dealing with the restoration of the temple, the last being a special promise to Zerubbabel.

Haggard, Andrew Charles Parker, (1854-1923), soldier, novelist, historian and poet, b. Feb. 7, at Bradenham Hall, Norfolk, and educated at Westminster School. He joined the King's Own Borderers 25th Regiment in 1873, and served in India, Aden, and Egypt. Fought at the battle of Samal in 1884; commanded the 1st Battalion of the Egyptian army in operations on the Nile (1885-6), was mentioned in despatches, and obtained medal and star D.S.O. His publications include: *Tempest Torn*; *Under Crescent and Star*; *Sporting Yarns*; *A Canadian Girl*; *The Amours of Henri de Navarre* and *Marguerite de Valois*; *Louis XI. and Charles the Bold*; *Women of the Revolutionary Era*; *Madame de Staël*. Died at St. Leonards, May 13.

Haggard, Sir Henry Rider (1856-1925), Eng. novelist and writer on agriculture; b. June 22, at Bradenham Hall, Norfolk. At nineteen years of age he went to S. Africa

as secretary to Sir Henry Bulwer, governor of Natal. In 1877 he was a member of the staff of Sir Theophilus Shepstone, special commissioner for the Transvaal; and in 1878 he became Master of the High Court of the Transvaal. He married Miss Margitson, of Norfolk, in 1879. He took a deep interest in rural and agricultural questions, being an exceedingly practical farmer and gardener on his own estate. In 1902 he published *Rural England*, a valuable study of rural conditions and of agriculture. In 1905 the Colonial Office commissioned him to inquire into the Salvation Army settlements in the U.S.A.—his report being published in 1905 as *The Poor and the Land*, with a scheme for national land settlements. As a novelist H. was publishing as early as 1882. *Cetywayo and his White Neighbours* appeared first. Among the most popular books are: *King Solomon's Mines*, 1886, one of the best-written and most thrilling of his romances; *She*, 1887; *Allan Quatermain*, 1888; *Jess*, 1887; and *The World's Desire*, 1890, written with Andrew Lang. He received the honour of knighthood in 1912—in recognition of his services to agriculture, for his novels were purely sensational. Died in a London nursing-home, May 14.

Haggis, an anct. Scottish dish, called by Burns 'great chieftain o' the puddin' race.' The stomach bag of a sheep having been well washed, turned inside out and salted, is filled about half full (room being left for expansion) with the heart, liver, and lungs of the animal, all minced, together with a large onion, half a pound of oatmeal, a pound of suet, salt, pepper, and half a teaspoonful of mixed spice; the addition of the juice of a lemon and some good stock is often found to be an improvement. The bag is then securely sewn up and left to boil for about three hours. It was common in England until the eighteenth century.

